NEW ZEALAND JOURNAL OF Agriculture

JULY
1947

IMPERIAL MYCOLOGICAL INSTITUTE
SEP 1947

L. C. MITCHELL

Original Massey Plant, Newcastle, Ontario, 1847

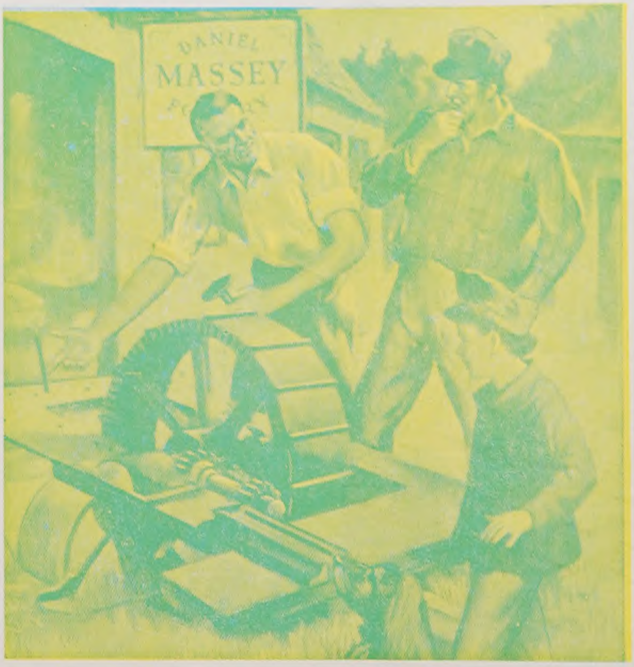
1947 ... a World-Wide Industry

THE roots of the world-wide Massey-Harris organisation extend back through 100 years of time to that day in 1847 when Daniel Massey set up his small shop in Newcastle, Ontario, Canada, and embarked on the business of manufacturing farm machines.

Until that day, the business of farming had been a back-breaking occupation. Except for the plowing of the land, practically all other operations on the farm—sowing—cultivating—cutting — raking — threshing, were performed with the work of the hand and the sweat of the brow.

Then, as the new machines from Daniel Massey's small Canadian shop proved themselves in actual field performance, the demand for machines bearing the Massey name grew steadily, and so pioneered the agricultural expansion of the great Canadian farmlands.

Adding triumph to triumph in the introduction of new ideas, the company has set the pace of leadership through the years, and today looks back from its organisation in every corner of the world to its humble beginnings one hundred years ago—looks back with the pride of achievement—looks back with appreciation of the efforts of the great army of dealers, branch and factory workers whose services through the years have created the greatest era of farm mechanization in the history of the world.



MASSEY HARRIS

FROM THE SICKLE TO THE SELF-PROPELLED COMBINE

A CENTURY OF PROGRESS IN FARMING IMPLEMENTS

1847 ~ 1947

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This month's cover

A farm scene near Garston, on the upper reaches of the Mataura River, Southland, is shown on this month's cover by L. C. Mitchell. The narrow farmable valley is bounded by the Eyre Mountains on the west, the Garvie Mountains on the east, and the Hector Mountains in the far distance to the north. The tussock-clad mountains are used for extensive pastoral farming and the lower arable land for root and cereal production combined with short-rotation grass for fat lamb raising. The stone stables illustrated are a feature on many Southland and Otago farms.

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The *Journal* is issued monthly. The subscription within New Zealand is 2s. 6d. a year; the overseas subscription is 5s. The *Journal* may be ordered from any bookseller or news agent, or direct from any office of the Department of Agriculture.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

Some of the finest bush and mountain scenery in New Zealand has been made accessible by the building of the Eglinton Valley road, which connects Te Anau with the Homer tunnel. Mt. Christina, in the background of this view from a winding part of the road near the Hollyford Valley, is typical of the mountainous grandeur of the district.

[*Government Film Studios photo.*

FERTILISERS AND PASTORAL FARMING

NEW ZEALAND is a country of pastoral farming, and it is the products of pastoral farming—meat and dairy produce—that are so urgently required by our kinsfolk in Britain. At this period of the year it may be helpful to review what should be done if the utmost use is to be made of pastoral lands during 1947-48 and succeeding seasons. Owing to the shortages of wire and other materials, our pastoral area cannot immediately be enlarged, but I feel a great deal can be done to increase the productive capacity of existing grasslands and improve the feeding of and lessen the mortality in flocks and herds. The Government, in negotiation with other countries, is doing its utmost to overcome the shortages of wire and other essential materials.

For the 1947-48 season the total phosphatic fertilisers available will be about 748,000 tons, which is a greater quantity than the Dominion has ever used before. While it is not sufficient to meet the full demands of farming, it is sufficient to raise the topdressing allocation by a third above the previous year's allocation and should enable farmers to increase both butterfat and meat production. However, to make the fullest use of the increased fertiliser ration, increased attention must be paid to the provision of winter feed. This is most essential in dairy farming, as it has been clearly demonstrated that the level of winter feeding has a very direct influence on seasonal butterfat production. For adequate supplementary feeding, two-thirds of a ton to a ton of hay or hay equivalent is required for each dairy cow. Many districts save considerably less, and the fullest use cannot be made of existing pasture lands and dairy herds until winter feeding receives closer attention.

The production from developed ploughable lands can also be increased by the resowing of worn-out pastures with seed of the highly-productive strains of grasses and clovers which are now available. Such a programme would fit in well with the increased fertiliser ration, especially as the ration for new grass has now been raised to 3cwt. an acre in the North Island and 2cwt. in the South Island. The higher topdressing allocation will increase the productivity of grasslands generally and will be reflected in the need for more stock. A ploughing-up programme in which a winter fodder crop is taken before the land is sown in grass would help with the very necessary provision of winter feed; existing flocks and herds would thus not only be better fed, but provision would also be made for subsequent increased carrying capacity.

Apart from better feeding the next most important factor which would lead to increased meat and dairy production would be the reduction of stock mortality. I believe this could be brought about partly by better feeding and care and partly by fuller use of the veterinary and other instructional services available. I know the present services are not quite adequate, and steps are being taken by my Department and the Meat and Dairy Boards to rectify the position, but I feel that the fullest use of the services available would help to reduce the mortality rates which annually cause a serious loss to our pastoral industries, and I am keen to co-operate with the Veterinary Council in order that stock mortality may be reduced to the minimum.

These then I feel are the essentials in an endeavour to increase production at the present moment: the fullest use must be made of existing pasture lands, flocks, and herds, and the foundation on which this must be based is the co-ordination of increased fertiliser usage with better feeding. I am anxious that all sections of the community should co-operate for greater production.

It may seem that in thus repeating the basis of increased pastoral production I am stressing the obvious, but I feel that the position must be put to all farmers so that the need for individual stocktaking is not overlooked. This increased fertiliser ration is at the moment a very precious commodity; its potential for increased production is great, and individually and collectively we have a responsibility to see that it is used to the best advantage.

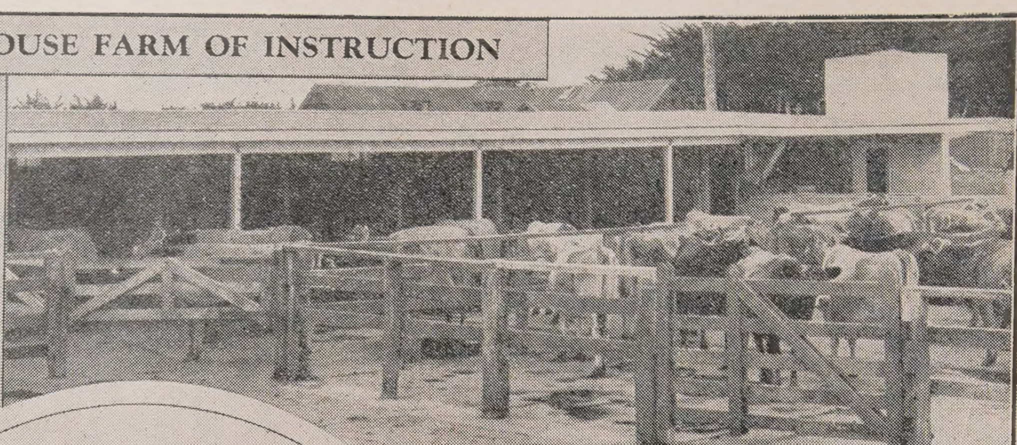
Further, I wish to point out that farmers in doubt about the most efficient method of using their increased fertiliser ration, of renewing grassland, of fodder crop production, or of livestock feeding should make the fullest use of the instructional and research services of the Department of Agriculture. The advice of the instructional service is based both on carefully-conducted research and close observation of the best local farm management methods. Topdressing, regrassing, and the feeding of livestock all involve certain local farm problems, and in the solution of these the Department's agricultural instructors can be very helpful.

The Government is doing everything possible to expedite fertiliser deliveries and has arranged for the integration of road, rail, and sea transport in an endeavour to see that the farmer's essential fertiliser rations are supplied in good time. The smooth distribution of fertiliser will require the fullest co-operation from all farmers to see that railway trucks are cleared as rapidly as possible. It is not generally realised that the quantity of fertilisers and lime now being transported by the Railways Department is greatly in excess of the pre-war tonnage; for the year ended March 31, 1947, the Railways Department transported 1,638,000 tons of fertilisers and lime, over 30 per cent. greater than the quantity carried in 1938-39.

As Minister of Agriculture I am fully aware of the difficulties, mainly concerned with shortages of certain essential materials, which farmers are facing in their endeavour to increase production. During the coming season, however, the phosphatic fertiliser allocation will be larger than ever before. This will give us one of the essential tools for increased production. Let us make the best use of it.

EDWARD CULLEN, Minister of Agriculture.

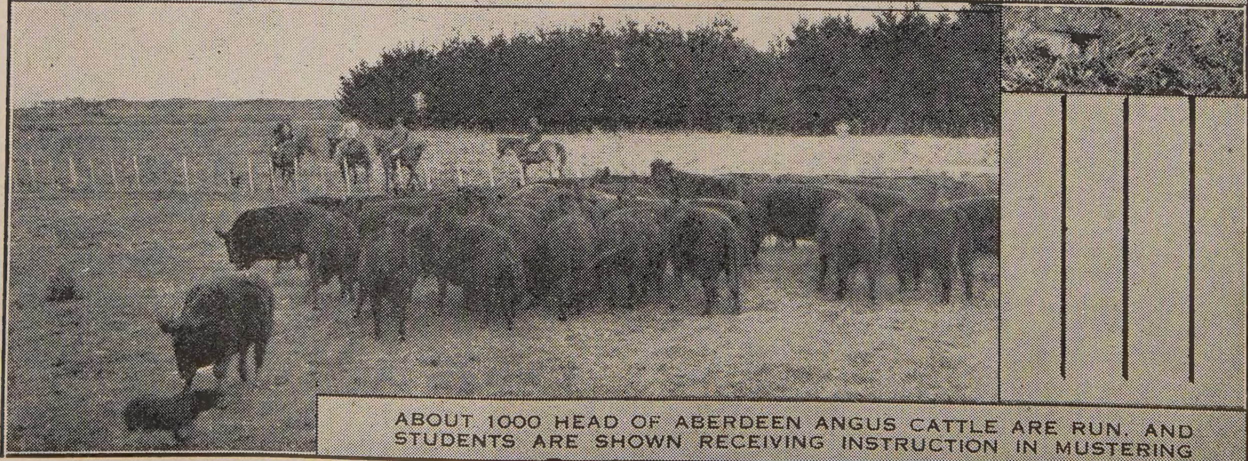
FLOCK HOUSE FARM OF INSTRUCTION



SOME OF THE HERD OF 100 JERSEY COWS IN THE UP-TO-DATE MILKING SHEDS

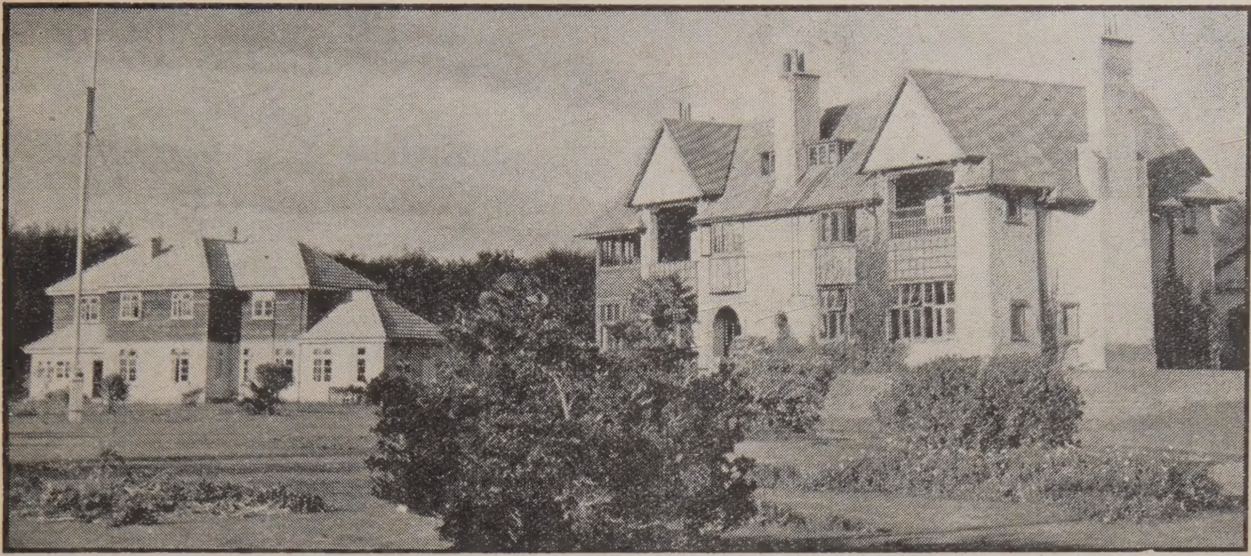
A PRUNING LESSON UNDER THE TUITION OF A FOREMAN INSTRUCTOR IN HORTICULTURE

FENCING IS ONE OF THE MAJOR SUBJECTS ON THE CURRICULUM



ABOUT 1000 HEAD OF ABERDEEN ANGUS CATTLE ARE RUN, AND STUDENTS ARE SHOWN RECEIVING INSTRUCTION IN MUSTERING

FLOCK HOUSE FARM OF INSTRUCTION



THERE is an ever-increasing need for trained workers in New Zealand agriculture and the old conception that only the dullard of the family should become a farmer must be disregarded today as farming becomes more specialised and more efficient. The importance of the primary industries to this Dominion demands that the brightest and best boys be educated to take over the ultimate responsibility of working farms. Unfortunately many lads who have some enthusiasm for a farming life are being lost to other walks of life, and one of the chief reasons lies in the lack of opportunities to engage in that calling. It is to overcome this that the Flock House Farm of Instruction has been reorganised and a comprehensive curriculum introduced to give a number of New Zealand boys each year an opportunity of obtaining a sound farm training before entering an agricultural college or going on to a farm for further experience.

AS well as giving an initial training in all branches of farming with the companionship of other boys, this course should make a trainee self reliant when he continues his farming career. There is much to learn on a farm nowadays and many farmers are far too busy to give personal tuition in the rudiments of farming operations, so that the course of instruction at Flock House is helping to fill the need for a greater number of farm assistants to be made available to the industry.

Flock House Station

Flock House Station was originally established in 1924 by the Trustees of the New Zealand Sheep Owners' Acknowledgment of Debt to the British Seamen's Fund for the training in agriculture of overseas boys. It was taken over by the New Zealand Government in February, 1937, and is now operated under the direction of the Fields Division of the Department of Agriculture.

It is now open to any New Zealand youth between the ages of 15 and 18 who has passed the necessary medical examination and is of good character and keen on agriculture. There is no entrance fee, the only cost being that of the regulation clothing outfit, a list of which is given later. The course occupies 12 months.

The property consists of about 8000 acres lying between the Rangitikei River and the west coast, and varies from rich alluvial flats along the river frontage to typical sand dune country along the coast. About 6000 acres are stocked, the balance being devoted to an afforestation scheme.

The property is farmed as far as possible along commercial lines, with due regard to the initial purpose of training. The farm tools, buildings, and implements are typical of those which would be used on any well-equipped farm of similar size and farmed on extensive lines.

Livestock on Flock House Station are as follows:—

Horses: Sufficient good-quality draughts are kept for adequate tuition in all horse work. Suitable hacks are available for all stock work.

Sheep: Approximately 9000 sheep are wintered, including 6000 ewes bred to Romney and Southdown rams, ewe lambs from the former being retained for replacements in the ewe flock and wether lambs and Southdowns fattened.

Cattle: There is a herd of about 100 good type Jerseys and the usual young stock. About 1000 head of well-bred Aberdeen Angus cattle are run, including a breeding herd of 350 cows. All steers are fattened on the property. A small stud herd is also kept.

Pigs: Purebred Berkshire sows are bred to Tamworth boars and all pigs are fattened.

Curriculum

While the new syllabus is based on practical lines, it is essential that all trainees be taught the fundamentals and principles of agriculture, and the course has been designed to give complete understanding of what the trainee is doing and why.

The main points of the course of instruction are as follows:—

There will be approximately 70 lectures. Full use is to be made of the bulletins of the New Zealand Department of Agriculture and other literature, and these are to be studied in conjunction with the appropriate lecture. Every phase of agriculture is to be covered and cyclostyled lecture papers are supplied to each trainee.

FLOCK HOUSE FARM OF INSTRUCTION

ABOUT 9000 SHEEP ARE WINTERED ON THE STATION, INCLUDING 6000 EWES BRED TO ROMNEY AND SOUTHDOWN RAMS

INSTRUCTION IN APIARY MANAGEMENT IS PART OF THE CURRICULUM

GOOD - QUALITY DRAUGHTS ARE KEPT FOR TUITION IN HORSE TEAM WORK AND HACKS ARE AVAILABLE FOR WORKING STOCK

FEEDING OUT SUGAR BEET TO THE PIGS. PUREBRED BERKSHIRE SOWS ARE BRED TO TAMWORTH BOARS AND ALL PIGS ARE FATTENED

The maxim "Learn by Doing" is a sound one provided the trainee fully understands and appreciates what he is doing.

Field days and demonstrations will be arranged to cover such places of interest as fertiliser works, woollen mills, freezing works, dairy factories, and stud farms. Full use will be made of educational sound films and lantern slides to make every angle of tuition clear. Lectures, however, will entail only a few hours each week. The greater part of the training is to be done in conjunction with the usual farm activities. Under the system of a weekly roster the trainee will learn all farming operations by actually doing them and working with the Foremen Instructors responsible for the sections.

The major sections under the control of a Foreman Instructor are at present as follows:—Dairying, shepherding, cultivation work, fencing, farm carpentering, and horticulture.

It has been arranged that all trainees shall join the local Young Farmers' Club at Bulls. They will be able to take part in the club activities and will be in the position when going to another district of really knowing something about the Y.F.C. movement and will be able to take part in the activities of clubs.

Progress Reports

A system of marking designed to give a true assessment of a trainee's progress over the 12 months has been initiated. Each week Foremen Instructors will award marks to trainees under their instruction during the week.

Short written revisionary tests will be held quarterly and will give a fair indication of the knowledge absorbed and also an incentive to consistent study of the lecture papers and a full application of the teachings of the Foreman Instructor.

Quarterly reports which will embrace not only the progress made, but also physical development and general behaviour, will be forwarded to trainees' parents.

Trophies are to be awarded to trainees who have endeavoured to obtain the maximum from the training offered. Competition, provided it is not overdone, has a considerable value in any training scheme. Sports trophies will also be competed for.

Remuneration

Remuneration paid the boys during the 12 months they are at Flock House is as follows:—

Period	Total Remuneration per week. s. d.	Amount to be held in savings account per week. s. d.
1st 3 months ..	2 6	1 6
2nd 3 months ..	5 0	3 6
3rd 3 months ..	10 0	8 0
4th 3 months ..	17 6	14 6

The three-monthly increase may be postponed or totally declined at the discretion of the Supervising Instructor if the conduct and progress of a trainee are inconsistent with his ability.

The compulsory savings account into which the bulk of a boy's remuneration is paid is opened on the boy's behalf when he is admitted, and only small amounts are paid to him directly as pocket money. At the end of a boy's training he may, with the consent of his parents, withdraw his accumulated savings and interest, or undertake to continue to make further regular deposits, or he may leave the money to the credit of his account, which bears interest at the rate of 3 per cent.

Any New Zealand youth between 15 and 18 years old who is keen on agriculture and has the necessary medical and character qualifications may become a trainee at Flock House Farm of Instruction. Applications for entry may be made now to

The Director,
Fields Division,
Department of Agriculture,
P.O. Box 3004,
Wellington C1.

Recreational

Sport and recreational activities are part of the new curriculum. Football, golf, tennis, cricket, swimming, and baseball are under the direction of housemasters. During the winter boxing, table tennis, hockey, handball, and other forms of recreation are arranged, including dancing practices, debates, and physical culture in the fine recreational hall near the hostel. Dances and social functions are held periodically.

Athletic and swimming sports are held each year and every trainee is expected to compete. Horse events are included in the athletics day programme.

The Country Library Service supplies books to the station and there is a canteen for the boys.

Non-denominational church services are held every Sunday by ministers of the various Churches in rotation.

Accommodation

Trainees are accommodated in the hostel, a two-storeyed concrete building in ideal surroundings, and dining-rooms, etc., are in an up-to-date annex. The buildings are lit with electricity.

When off duty the boys are under the supervision of a Housemaster, the domestic arrangements being in charge of the Matron, who is a fully-qualified nursing sister. The food is good and ample.

Rules and Regulations

Trainees must at all times conform to the rules, which will be strictly enforced. Any wilful damage will be charged against the boy concerned.

Everything possible is done to ensure that the trainees enjoy an instructive, interesting, and happy life during their period of training at Flock House, but it must also be emphasised that an ordinary standard of conduct and diligence is expected of them, and any boy who after due warning does not measure up to the required standard and will not play the game will be discharged.

List of Clothing

The following is a list of clothing, etc., required by every trainee on entering Flock House:—1 overcoat, 1 best suit, 2 sports coats, 2 pairs of grey trousers, 3 khaki or dark grey shirts (suitable for working), 3 grey shirts (school type), 2 best shirts, 3 denim or similar working trousers, 1 working coat, 3 singlets, 3 pairs of underpants, 3 pairs of best sox, 6 pairs of working sox, 6 handkerchiefs, 3 pairs of pyjamas, 3 towels, pullover, 6 pairs of leather laces, 3 pairs of cotton laces, hat or cap, clothes hangers, hussif, bathers, belts, braces, boot-cleaning outfit, hair, clothes, and tooth-brushes, oilskin, sou'-wester, gumboots, working boots (military type, not too heavily nailed), sandshoes, slippers or sandals, football boots, football jersey and pants (if footballer), tennis racket (optional), 2 blankets and a rug. Extra garments would be an advantage during training, as many in the foregoing list would require renewal at the end of six months. **All clothing should be clearly marked with the trainee's name.**

Application and Entry

New trainees will be admitted in the middle of January, at the end of May, and at the end of August. Applications for the end of August are now being received.

As accommodation is limited, early application is essential; if the number of candidates exceeds the vacancies, early applicants will receive priority.

The Department of Agriculture will undertake, if desired, to find suitable employment for each boy at the completion of his training, provided his work and conduct have been satisfactory.

Shortage of Caustic Soda for Cleaning Milking Machines

FOR the past 30 years caustic soda has been consistently recommended by the Dairy Division as the most satisfactory chemical to be used for cleaning milking machines and the method is described in Bulletin No. 118, "Cleaning of Milking Machines." However, owing to the coal shortage and other production difficulties in England, normal supplies of caustic soda are not available for export. Imports of caustic soda and other alkalis such as soda ash and trisodium phosphate are reaching New Zealand in reduced amounts, so that during the coming dairy season in many districts there may be a temporary shortage of these chemicals.

TO meet the present need for some alternative cleanser for milking machines and dairy utensils the Dairy Division finds it necessary to recommend soap. In the past this has been used with success by a few careful farmers, but cases have often occurred where the use of soap proved unsatisfactory because sufficient care was not taken to rinse it out of the machine with boiling water. Deposits of soap were found to accumulate in the machine and to give rise to a bad flavour, especially in cream. Because of such failures the Division has been reluctant in the past to encourage the use of soap.

The method to be used is the same as described in Bulletin No. 118. As soon as the milking is finished large quantities of clean cold water should be flushed through the teat cups till it runs clear from the releaser. It is hardly possible to use too much cold water, as that helps to prevent the formation of milkstone deposits in which millions of germs can develop and contaminate the milk. Liberal rinsing with cold water at this stage is particularly necessary where soap is used, and it has a greater tendency to build up deposits. The dirt on the outside of the teat cups and claw rubbers must then be washed off with some hot soapy water and the equipment rinsed with clean hot water.

The next step is to flush out the machine with a solution of soap in boiling water in the same way as when using caustic soda. To prepare the soap solution, place two or three pieces of common soap about the size of a large walnut in an ordinary domestic soap-shaker. As the boiling water is running into the bucket stir the soap-shaker to dissolve the soap and produce a good lather. Alternatively, a bar of soap may be fixed on a piece of board with nails and stirred in the bucket of boiling water. The use of a scrubbing brush to make the soap solution is not recommended, as it produces many small fragments of soap, and if these do not dissolve completely, they may settle inside the machine.

The hot soapy water is drawn through the machine, at least 1 gallon being put through each set of teat cups. A can or bucket may be placed at the releaser or vacuum tank to collect the soapy water for use later to wash separator parts, buckets, and other equipment. To rinse out all traces of the soap boiling water must be sucked through the machine, at least 1 gallon being passed through each set of teat cups, and this must be done **immediately** after using the soapy water. If the rinse water is not hot enough, soap will be deposited in various parts of the machine and will spoil the flavour of the milk or cream. Care must be taken to avoid the use of soap containing carbolic or other pronounced perfumes; good, plain, laundry bar soap is preferable to home-made soap, which is apt to produce deposits in the rubberware. Soap powder at the rate of 1 or 2 teaspoonfuls to 4 gallons of water may also be used, but some brands of soap powder appear prone to produce white deposits in the rubberware. A good plan is to prepare some soap jelly daily by pouring boiling water on soap flakes; this will be found to dissolve readily in boiling water next day.

In some districts limited supplies of other substitutes for caustic soda, such as soda ash, trisodium phosphate, or metasilicate of soda, may be available. Satisfactory results may be obtained by using these alkalis more liberally than caustic, at the rate of a tablespoonful or more to 4 gallons of water. The best substitute is a mixture made up under various trade names and containing about 75 per cent. of soda ash and 10 to 15 per cent. each of metasilicate of soda and trisodium phosphate. Soda ash mixtures should be used more liberally than caustic, 2 to 4 teaspoonfuls to 4 gallons of water. For softening the hard water on some farms the soda ash mixture is particularly recommended, but it must be added **before** putting in the soap, at the rate of a teaspoonful to 4 gallons of water. Another alternative alkali which may be available is caustic potash; it should be used in precisely the same way as caustic soda.

These methods have been used to a limited extent in the past, and have given good results when care was taken.

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA, Auckland, at 7.15 p.m. on the following dates:—

August 4—"Current Farming Problems," by E. B. Glanville, Assistant Fields Superintendent, Auckland, and P. S. Syme, Instructor in Agriculture, Warkworth.

August 11—"Activities Within the Hive," by R. S. Walsh, Apiary Instructor, Auckland.

August 18—"Incubation and Rearing of Chickens," by H. A. Kitto, Poultry Instructor, Auckland.

August 25—Young Farmers' Club session by S. Freeman, Organising Secretary of Young Farmers' Clubs, Wellington.

BOOK REVIEW

"The Farms of Great Britain": H. G. Sanders and G. Eley

THIS outline of the farm management methods of 11 farms given in "The Farms of Great Britain" is probably the best treatment of the subject since Sir Daniel Hall's "Pilgrimage of British Farming." Not only does it give the story of how farmers adjusted farm management methods to meet the wartime food demands, but it provides an excellent study of the effect of soil, climatic, and marketing factors on production methods.

The book summarises a B.B.C. series of discussions on "This is My Farm." Eleven different but typical farming areas of Britain were chosen for inquiry and from each a well-known farmer was selected to discuss the reasons for his particular system of farm management.

Although British conditions are different from those in this country, New Zealand readers will find much to interest them in this book. For each farm particulars are given of the gross receipts per acre and per man. The per acre receipts vary from 30s. for an extensive sheep farm on the Scottish Borders to £40 for an arable farm on the Lincolnshire silts. Three farms have gross receipts of £10 an acre, three £20, two £25, and two £30 or more. The gross receipts per man employed (out of which, of course, have to be met the necessary proportions of rent and working expenses) vary from £600 to £1200; seven of the farms are in the £600 group.

—P.W.S.

Crosby Lockwood and Son, Ltd., 12s. 6d. net.

N.Z. WOOL QUALITY AND MARKETS

Secretariat Chairman's Review

"I AM not pessimistic about the future of any wool; there is no substitute for wool, but we must keep up a world-wide programme of promotion and development," said Dr. Edgar Booth, chairman of the International Wool Secretariat, in a message to New Zealand sheep farmers after his recent visit to this country as the guest of the New Zealand Wool Board. "We have a good article," said Dr. Booth, "but even good articles are challenged and must be improved. It pays to develop something which is worth improving and to advertise an article worth selling. It is also essential to remember that everything we accept as fact is so only in the light of our present knowledge, which it is therefore profitable to extend."

THE New Zealand Wool Board is a subscriber to the International Wool Secretariat and is one of the three Dominion Wool Boards thus united to serve overseas, as they do individually in their own countries, the interests of their wool growers. Dr. Booth recently returned to the headquarters of the Secretariat in London after visits to Australia (his own country), New Zealand, U.S.A., and Canada.

"The New Zealand sheep farmer," said Dr. Booth, "has to be a common-sense business man, or he will go out of business. Apart from a small number of farmers who depend on stud flocks for a living, the business of the New Zeland sheep farmer is to raise sheep for the production of meat and wool. His problem is simple, but its solution difficult. He wants to make as big a total profit as he can for his labour and money invested, with due regard to the common sense of maintaining a rational average return over many years."

Demand for Fine Wools

What are the known and unknown factors in the New Zealand sheep farmer's problem? "He lives," said Dr. Booth, "in a country which, within our present knowledge, is not generally suitable for the Merino, but in which the New Zealand Romney is stated to do best and to be profitable to his owner when crossed with the Southdown. The Romney produces wools which are referred to as 'medium Crossbreds,' and which are not at present in maximum demand. The demand is now, and will continue to be, for fine wools, causing a spreading differential in prices.

"New Zealand Crossbred lambs are undoubtedly far superior to their Merino cousins in meat value. While we live in a meat-hungry world, carcass value remains very important, and the sheep farmer may be content to accept what is inevitable within present conditions—that is, a higher return for meat and a lower return for wool. Can he get a safer average, or a better total? What may happen later?

Emphasis on Medium Crossbred

"The International Wool Secretariat is emphasising overseas the great value of your medium Crossbred wools for many purposes—it is excellent for hand-knitted socks and stockings, particularly of the sports and school variety, where strength and durability are important. It is superior also for sportswear—for lads, lasses, golfers, footballers—and we can and will sell it. It is not going to fetch the right price compared with finer Crossbreds (56's-58's) or with Capes or Merinos. Superfine Merinos will fetch fancy prices, but will probably be unprofitable on account of the light weight per fleece in that fancy bale.

"I have studied the problem of wool growing in a number of countries, of big and small producers: Australia, New Zealand, U.S.A., South Africa, England, and smaller wool producers. I have met and talked also with buyers and brokers, textile and garment manufacturers, and with the wearer or other user of our wools in a very wide range of places. I've been trained as an engineer, a scientist, and an administrator, and I really do know quite a lot about the world wool picture, because I'm intensely interested in the job and have the best opportunity to see this picture from every angle. The International Wool Secretariat exists to change this picture in favour of the wool grower, and slight changes can often make a great difference.

[*Photo News Ltd. photo.*
Dr. Edgar Booth.

"The lower grade medium Crossbreds are going to be the hardest wools to sell at a proper price," continued Dr. Booth. "They are not really wanted as carpet wools and are not in most popular demand as fabric wools, but we are right out to sell them, using to that end every possible scientific development yet available. Definitely, the finer the wool in any class, the more readily saleable it is. There is a tendency in New Zealand to breed broader fibre, which is certainly associated with greater weight of fleece, but unless a back-breaking weight of fleece is produced, 48's will give a greater gross return than 42's, and be more easily sold. I think you can breed finer than that, keep up to profitable fleece weight, and still have healthy animals. If you can't, then that problem will have to be solved (and it can be solved) when the return on meat drops back so that there is a bigger percentage return on the wool. There are still a number of countries producing very broad wools, and there are still very big quantities of these in the world's stock piles.

Future Markets

"The wealthier sections of the world (on a per capita basis) are keen on lightweight wool materials, worsteds, and fine stuffs. Even the woollen-piece manufacturer does not want to go low in the 'forties.' Yet there are still other lands and great populations, and if Merinos and the better-quality Crossbreds are cleared at a good price every year, these other masses of peoples can absorb the medium and lower Crossbreds at a reasonable price, the balance being made up on the better 'meat' return.

"Only about three-quarters of a pound of scoured wool is available for each person in the world. Some have never worn wool, some could never afford to buy wool, but even the total number of potential small buyers means that wool will be in short supply if its merits are pressed on the world's markets. . . . New Zealand in particular has big future wool markets in India. The Secretariat has just completed a comprehensive survey in that country and is about to recommend development of that market. India can use wool, particularly the 'medium Crossbred,' and can pay for it."

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Reasons for Decline in Raspberry Crops

PRODUCTION CAN BE INCREASED BY DISEASE CONTROL AND METHODS OF CULTURE

By J. H. WATT, Orchard Instructor, Christchurch.

UNDER-PRODUCTION of raspberries, the most important of the Dominion's small fruits, is giving concern at present. However, it has been proved that there are ample stocks of good varieties in New Zealand from which it will be possible to supply all the canes necessary to increase production, if adequate disease-control measures and methods of culture are adopted.

THE main raspberry-growing areas in the Dominion were recently visited by the author, who found that many growers complained that varieties were "running out." It was evident from production figures that fruit, both in quality and quantity, was deteriorating, but this is not necessarily due to the plants "running out." The methods of culture seem often to be the main cause of crop reduction. In some cases, particularly in old gardens, there was a high incidence of seedling plants (rogues) in the plantation. Generally these were of a poor type, giving light crops of inferior fruit, thus reducing the crop average and therefore the total crop from the area. Also there has been little selection of suckers when new areas have been planted up.

Because of the confusion in nomenclature of raspberries in New Zealand, it is necessary to start to classify varieties, at least as far as New Zealand is concerned. Then in due course, for it will take some time, it should be possible for a grower to find out what variety of raspberry does best on his soil type and in a particular district, so that he will be able, with confidence, to order more of the variety when required.

An identification key form has been devised, and the main varieties grown in each district closely studied, as well as any seedlings or "off-types" which have shown promise.

Cropping Trials

At the same time varieties and types were selected and tagged for cropping trials shortly to be instituted by the Horticulture Division. More than 70 varieties and types were selected, some of which will no doubt prove to be duplicates, but it is expected to select the strongest types of all promising varieties for propagation.

Many growers think that it will be necessary to import new varieties before it will be possible to improve production, but this survey has proved that there are ample stocks of good varieties in New Zealand from which it will be possible to supply all the canes needed to increase production, if adequate disease-control measures and methods of culture are adopted.

Diseases and Pests

In almost every district the incidence of fungous diseases is high, mainly because growers have not learned to recognise the diseases or realised the loss of potential cropping they cause.

Cane wilt (*Leptosphaeria coniothyrium*) occurs throughout New Zealand and is probably a major cause of crop reduction. Cane wilt can be controlled by the use of Bordeaux sprays, but it should be noted that effective control cannot be achieved unless a definite spray programme is adhered to and efficient equipment used. Most growers do not spray for this disease, while those who do so often use inefficient equipment and so obtain results far from satisfactory.

Cane spot (*Elsinoe veneta*) is generally unrecognised as a disease and so has been little heeded. It is said to be normally of minor importance, but its high incidence in gardens throughout the areas inspected indicates that it is on the increase and seems to be causing considerable crop losses by killing buds. As in dealing with cane wilt, Bordeaux sprays will give control.

Septoria spot (*Septoria rubi*) is fairly general, but is not regarded as of much importance. When serious infection occurs it often causes premature drying of the leaf, followed by early leaf drop, which combine to affect the size of fruits and also to reduce the vigour of the canes which will carry future crops. Control is fairly readily obtained by using Bordeaux sprays as for cane spot and cane wilt.

The "nigger in the woodpile" indicated by the wooden arrow is silver leaf fructifications which often abound on dead wood and are a potent source of infection to raspberries.

Silver leaf (*Stereum purpureum*) is fairly general, particularly in the Wairarapa, Nelson, and Christchurch districts. Canes are sometimes severely affected and crop loss occurs. The only control measure known is to dig up and destroy all infected stools and to remove all other sources of infection. Fructifications occur only on dead wood. Good pruning methods and garden hygiene can do much to stamp out the disease. If precautions are taken from the time when a garden is planted, it should be impossible for the disease to gain a hold.

Root rot (*Armillaria mellea*) occurs in patches which may spread in all directions. The infection is caused by a fungus which attacks the roots of all plants within the affected area and eventually kills them. In some areas, particularly the Wairarapa and Christchurch, there have been outbreaks of fairly grave proportions, but generally root rot is not regarded as a serious menace to raspberry production. The spread of the fungus can be controlled by isolating the areas, destroying all the plants within them, and treating the soil with a sterilising agent.

Crown gall (*Phytomonas tumefaciens*) is fairly widespread, having been found in the Wairarapa, Christchurch, and Roxburgh districts. Its effect on raspberries is not well

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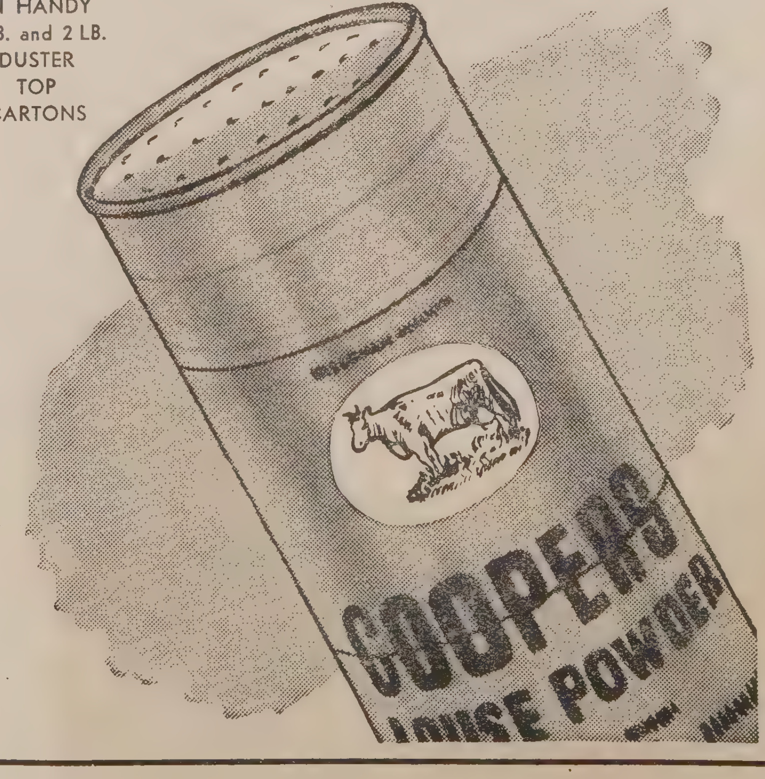


Raspberry canes killed by the root rot fungus *(Armillaria mellea).*

known, but it is certainly not good to have it in the ground, as it persists and attacks other important crops. Infected areas should be isolated and no canes taken from them for planting.

Virus diseases: It is thought that virus infections of raspberries are fairly widespread in New Zealand, but as yet this has not been determined. It is possible that virus diseases have been a major factor in reducing crop yields, particularly in the Wairarapa and Waimate areas. It will take some time to determine how detrimental these diseases are and how far they have become disseminated through raspberry plantations.

The rogueing of infected plants and the propagation of disease-free or resistant varieties are the only known means of reducing the incidence of virus diseases.

Raspberry bud moth (*Carposina adreptella*) occurs throughout New Zealand wherever raspberries are grown. It is the most serious pest to the crop and damages it by eating out buds during the dormant period, attacking young shoots and foliage during the growing season, and attacking the fruit.

Damage to buds has often resulted in extensive seasonal losses; gardens have been seen in which a high proportion of canes were completely denuded of buds through the depredations of the pest. In addition, a much higher percentage of canes had a number of buds destroyed, so that the total damage must have caused a severe reduction of crop.

Injury to young shoots reduces the height of the growing cane and causes axillary buds to break into growth, often resulting in a many-branched cane too low set to be of use for fruiting the following year. Where incidence of shoot damage is high there may be a serious reduction in the number of canes to carry fruit in the next season.

When the fruit is attacked some of it may be lost and much of the remainder is usually of poor quality because of the presence of caterpillars in the berries.

Spraying with arsenate of lead, if adequate and timely, will control the bud moth. Investigations are still necessary to find the best methods of control from the pre-harvesting to post-harvesting period.

Grass-grub (*Odontria zealandica*) causes extensive damage in gardens on the lighter soil types by eating the feeding roots of the stools. Arsenate of lead, used as a soil dressing, should be effective in controlling this pest in districts where it is liable to cause serious losses.

Bronze beetle (*Eucolapsis brunnea*) occurs in some of the northern areas in sufficient numbers to do considerable damage to foliage, as well as by eating through the fruit stalk. Spraying with arsenate of lead is not a very effective control, but a good spray programme to control bud moth and the carrying out of recommended hygiene, including the destruction of plants such as blackberry on which the bronze beetle breeds, will do much to reduce this pest.

The present use of spray specifics to control diseases and pests leaves much to be desired. The value of spraying to control cane spot, cane wilt, leaf spot, and raspberry bud moth was proved by experiments carried out by officers of the Plant Diseases Division of the Department of Scientific and Industrial Research at Motueka and Riwaka between 1940 and 1945. The increase in crop yields shown by these trials more than repays any costs involved.

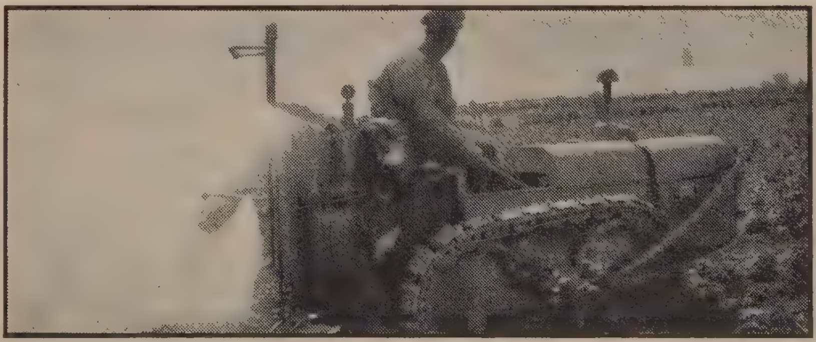
Few raspberry growers have spraying equipment suitable to their needs. Commercial growers should have power outfits capable of a reasonable pump delivery at a pressure of about 250lb. per square inch. Five combination sprays of Bordeaux mixture and lead arsenate should be applied annually until control of the diseases and pests mentioned above has been effected, after which it may be possible to reduce the number of applications to three.

A great deal of experimental work has yet to be done with sprays to ascertain the most efficient strengths to use, the most suitable times for application, and the minimum number of applications, but the way is already clear for growers to effect a great improvement in health, vigour, and cropping capacity of their plantations by spraying.

It may be possible to obtain a method of control by using dusts in place of normal wet sprays, a case in point being the control of raspberry bud moths during the fruit-harvesting period, when it is not desirable to spray, but when a dust may prove suitable.

Hygiene

Fungus disease infection could be much reduced if adequate garden hygiene practices were adopted. The main fault in this respect is inefficient pruning, as stubs of dead cane up to 9in. long are prevalent, and on these fructifications of cane wilt, cane spot, and silver leaf fungi abound.



Spray outfit of the crawler type with power take-off and fixed boom used by large-scale raspberry growers.

All canes should be cut to ground level at pruning time, leaving as little as possible of the old cane on which fungus diseases can carry over infection to the following season. All prunings should be burnt immediately and dead stumps in hedges and shelter belts should be removed to minimise infection from silver leaf.

Manuring and Cultivation

In most districts the application of fertilisers is somewhat haphazard, and there is scope for much experimental work in the use of organic and inorganic manures, green crops, and mulching material. Growers are urged to use more of these materials immediately to increase the vigour of the canes and to increase crop yields.

Lime is used more or less throughout the raspberry-growing areas, but little thought is given to consequences through excessive amounts being applied, and it is suggested that all soils on which raspberries are grown should be tested before lime is added. Cases were seen where over-liming may have been the cause of chlorosis and crop deterioration in raspberry plantations.

Cultivation is generally quite satisfactory, but, if it is continued right up to harvesting, the use of implements probably does more harm than good. Often weeds in the rows are allowed to take charge and become a nuisance to pickers; seeds of plants such as thistles and willow weed drop into the pickers' buckets and give a dirty appearance to the fruit.

Possible Expansion

There seems to be opportunity and ample scope for increased production in all areas; suitable land and available labour are the limiting factors in most districts. Neither direct-to-consumer supply nor supplies to the factory are near saturation point in any part of New Zealand, while markets in the Auckland Province obtain practically no supplies of raspberries.

It is suggested that, while increased production in established areas will help to satisfy present markets, with more efficient transport new markets could be supplied. However, it is thought that areas suitable for raspberry production could be found in the King Country, particularly near the timber-milling towns, where labour would be available.

In this area winter conditions are fairly severe, rainfall is adequate, and the soil is suitable, while the wives and children of timber workers might provide an adequate supply of seasonal labour. Transport facilities would enable the fruit to reach the Auckland markets in good condition.

Stand of Lucerne Successfully Established on Karaka Country

By A. D. MERCER, *Fields Instructor, Thames.*

THE maintenance of an adequate feed supply for dairy herds during a dry summer is an often-recurring problem, particularly on soils which tend to dry out, such as the lighter soils on the karaka country along the southern shores of Manukau Harbour. A stand of lucerne is the best insurance against this difficulty, and that the crop can be successfully established on such soils has been demonstrated at the Kingseat Hospital farm.

ONLY in the past 20 years has the karaka country come to be recognised as capable of transformation into dairy farms. Previously the light soil of this scrub-covered region was considered of little value, but adequate top-dressing and pasture sowing have converted it into valuable dairy land. However, a dry summer is always likely to cause a fall in the returns of the farmer relying solely on pastures for summer feed, and the value of a stand of lucerne such as that at the Kingseat farm is far greater than the effort and expense involved in its establishment.

The area of 12 acres was ploughed out of mangolds in the winter of 1945 and a ton of lime an acre spread on the furrow. As the land dried out in the spring it was well worked to a fine seed-bed, the roller playing an important part in securing the necessary fineness and consolidation. After the final rolling inoculated seed was sown broadcast at the rate of 18lb. an acre and lightly harrowed, a dressing of 2cwt. of superphosphate and 2cwt. of lime an acre being applied at the same time.

Good Strike in Dry Summer

The benefits of thorough cultivation and a good seed-bed were strikingly manifest on this area. From the time of sowing in November, 1945, until the middle of March, 1946, the Auckland district suffered the driest summer on record, but the strike was thick and even. Though by February the growth of the lucerne was at a standstill, and it appeared doubtful whether the young plants would hold out much longer, they survived until rain in March saved the situation. The field was topped with the mower early in February to remove the growth of *Amaranthus*, or redroot, and since then the thick stand and rapid growth of the lucerne have successfully kept weeds in check.

During the 1946-47 season the area was cut three times until March, when it was ready for another cut, but because of pressure of other work only a small portion was mown then. On this small area a fifth cut was ready for greenfeed at the end of April. The first cut in the spring was made into silage, the later cuts into hay.

The success achieved with this first sowing in an unfavourable season led to the sowing down of a further 18 acres to lucerne in the following year, and if a practical demonstration of the establishment of lucerne on the soil of the karaka district was all that was lacking to convince the hesitant, this example should soon be followed on other farms.

Identical Twin Calves Wanted

For Research at Ruakura

IDENTICAL twin calves are again wanted this year for research purposes at the Department of Agriculture's Research Station at Ruakura, and farmers who believe they have sets of identical twin calves are asked to advise the station by telegraph or letter. The station's telephone number is 4790 Hamilton and the postal address Private Bag, Hamilton.

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Identical twins are always of the same sex and must also have exactly the same coat colour, head shape, body conformation, and pigmentation of ears. Mouth and tongue markings and whorls and body size must also be similar. Not too much attention should be paid to difference in white marking, although the general pattern should be similar.

Identical calves will be paid for at £2 a head, plus 1s. 6d. a day per calf up to 14 days of age. If the calves are older than this on collection, the price will be by agreement.

Report by FAO's Mission to Greece

By **J. V. WHITE,** *Investigating Officer, Rural Development Division, Wellington.*

IN an article on the United Nations Food and Agriculture Organisation in the February "Journal" reference was made to a special mission sent at the request of the Greek Government to give expert advice on a general programme of agricultural rehabilitation and reconstruction. Recently FAO published a full account of this mission's work and a report of the recommendations made. This article, summarising that report, gives some idea of the task undertaken and illustrates one of the many methods by which FAO will be of inestimable value to the backward countries.

The programmes for school meals have been largely responsible for the physical improvement of the children.

THE mission consisted of technical authorities on all branches of agriculture and on fisheries and forestry from the United States of America, Britain, and France. Work was begun in May, 1946, and continued throughout June and July of that year. The report is divided into two main sections, the first containing recommendations for dealing with the immediate problems facing the Greek Government, and the second and more detailed section presenting a comprehensive, long-range plan for Greek agriculture and development generally.

Food Supplies

Most important of the immediate problems is, of course, the food shortage. To cope with this it is suggested that through the 1947 crop year the Government continue an agricultural programme with maximum emphasis on food production for direct human consumption, bread and other rationing to be continued and the feeding of coarse grains to livestock to be reduced to a minimum.

Coupled with this is the continuation of the special feeding programmes initiated by UNRRA, which represents one of the greatest successes of that organisation. These programmes for school meals and for milk and other supplementary foods for babies, pregnant women, and mothers have yielded an enormous improvement in the physical condition of Greek children.

Financial Support

An integral problem in the recommendations is that of obtaining the necessary funds. At present it appears that UNRRA food shipments to Greece will end during 1947. Therefore it is recommended that the Greek Government request the Economic and Social Council of the United Nations and the Governments of the United States and the United Kingdom to aid it in securing funds for the continuation of essential food and other imports to bridge the gap until expanding exports, as a result of increased production and international development loans, enable Greece to balance its international accounts without special aid.

That will probably involve working out some Government arrangement with private agencies (including the Greek War Relief and Near East Foundations), obtaining temporary financial help, reducing public expenditure, and/or increasing tax receipts sufficiently to finance the entire programme from the Greek national budget.

Though the report makes it clear that the main efforts of reconstruction will have to come from the Greek people themselves, it recommends an International Bank for Reconstruction and Development loan of 100,000,000 dollars for 1947-48. This loan would be available for the rehabilitation and development of transportation, water and hydro-electric projects, farms, marketing, and private industries in accordance with the programme recommended to develop and modernise Greek agriculture and industry.

Rehabilitation

The mission recommends that the Greek Government give special emphasis to speeding the rehabilitation of the country's most essential productive equipment, especially transportation and communication facilities and repairs to industrial plants and drainage and flood-control works. That will necessitate a temporary programme of citizen and armed forces labour on the roads to put them into reasonable shape.

It also urges the immediate purchase of essential equipment—especially automotive and engineering plant and large and small ships—and the rapid development of a temporary housing programme, especially in the bombed-out villages.

Currency and Exports

The mission makes a number of recommendations with the object of preventing further inflation of the currency, the main ones being the in-

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creasing of production, the stabilisation of prices, and the maximum reduction in non-essential expenditure.

It recommends that the Greek Government make every endeavour to restore the export markets of tobacco, currants, and other products. To achieve that it advises reducing internal prices to lower farm costs, removing export taxes on exportable commodities, and providing special technical and financial assistance to farmers, farm co-operatives, and private exporters to restore and improve the quality of export products.

Those are the mission's main recommendations to bridge the present crisis in Greek affairs until the longer-range activities begin to bear fruit. It is with these long-range development plans that the mission was more concerned, and here occurred an opportunity for FAO to demonstrate in what ways it could be of real value and assistance to the backward, undeveloped countries. That aspect of its work was covered by the mission in considerable detail and it will not be possible to do more than touch briefly on some of the main recommendations.

Putting Rivers to Work

The utilisation of water was considered by the mission to be fundamental to other technical developments and basic to any improvement in the economic and social condition of the Greek people. Greece is a small, mountainous country of 50,000 square miles (less than half the size of New Zealand), of which only about one quarter is cultivable land. The shape of the country and its mountainous topography result in all the rivers being short and swift, which poses immense problems of flood, silt, erosion, and river control. The mission classified the work in order of importance.

Class 1 projects consist of the rehabilitation of drainage and irrigation projects now in partial operation but in poor condition because of lack of maintenance, the continuation of necessary erosion control work already under way, and the initiation of new work where further destruction of agricultural land is threatened.

In class 2 the mission enumerates the construction of new projects for flood control, drainage, irrigation, portable water supplies, and hydro-electric power in which the ratio of benefits to costs is high.

In class 3 the mission advocates the development of large multi-purpose projects which will yield major benefits but which require large investments, long construction periods, and development of adequate markets, whether the resulting products are agricultural commodities, fertilisers, or electrical energy.

The mission emphasises that the water potentialities of Greece are considerable and that completion of the full long-term programme would make possible the irrigation of about one fifth of all the cropping land in Greece and result in the development of as much hydro-electric power as that produced by the Boulder Dam project in the U.S.A.

Measures to Improve Agriculture

The mission discovered at a very early stage that something much wider than technical advice on modern farming technique was required to improve the country's agriculture. It was obvious that the whole economy of Greece would have to be considerably modified. No possible application of agricultural science could convert the small, uneconomic holdings of the Greek peasants into payable farms. Clearly, there would have to be some consolidation of those holdings into larger units and development of other industries to absorb surplus workers, including the numerous unemployed at present in the cities. It is emphasised that this proposed shift to more intensive agriculture and larger farms, and from farming to other industries, should be brought about by gradual and voluntary action of the people responding to the opportunities which will be automatically created rather than by directives of the Government.

The average of cropland per person on farms is only 1.3 acres in Greece—about the same as in India—compared with 4 to 6 acres in the United Kingdom, Sweden, and Denmark, yet the average yield of grain is 13.5 bushels an acre, about one third to one half the average yield in most countries of Europe. New Zealand's yield of wheat alone is 33 bushels per acre, and other grains are all higher.

The mission advocates considerable technical development in agricultural research and the general development of agricultural organisation. The Ministry of Agriculture advised to administer this programme, consisting of a Minister, a director, three assistant directors, and ten chiefs of bureaux, closely resembles New Zealand's Department of Agriculture. All the appointments, except that of the Minister, are to be non-political. The bureaux are approximately equivalent to the New Zealand Divisions—Fields, Livestock, etc.

Research and Reorganisation

Special emphasis is laid by the mission on the reorganisation of the livestock industry. Much of Greece's livestock was lost during the war and it is stressed that an excellent opportunity to restock with good-quality animals now exists. The use of artificial insemination is strongly advocated. Nearly three quarters of the area of Greece, it is stated, is in natural pasture and unsuited to any other purpose. The pre-war consumption of animal products in Greece was below the minimum satisfactory to human health.

Consequently, the mission did not hesitate to advocate a programme of livestock development, the gist of which is that full regard be paid to the breeding and maintenance of suitable stock for different localities, the adequate supply of nutrients for these stock, the taking of active steps to prevent avoidable losses through stock disease, and the provision of adequate facilities for the marketing and use of livestock products.

For other branches of farming the mission recommends programmes of general research into all branches of crop husbandry (particularly grape growing and wine making), into soil fertility, and, of considerable importance, into the education of Greek farmers along the lines of modern scientific farming.

As with agriculture, the mission suggests that research and educational work in connection with the fishing industry be advanced as rapidly as possible.

Economic Measures

The mission recommends that the Greek Government expand the financial facilities for agricultural and consumer co-operatives through the Agricultural Bank of Greece. The village co-operatives, co-operative unions, and the Agricultural Bank are described by the mission as "constituting together one of the most dynamic and effective forces in present-day Greece." It is recommended that they be developed further by assisting them to extend production credit to farmers and by making long-term loans for the purchase of equipment for operation by village co-operatives and co-operative unions.

Other general proposals cover far-reaching reforms in the present tax structure and a thorough revision of the Public Service so that it will be staffed by qualified personnel paid a living wage.

To support all the measures recommended the report advocates the establishment of a United Nations Advisory Mission representing the Economic and Social Council, FAO, the International Bank for Reconstruction and Development, the International Monetary Fund, and other interested international agencies to provide continuing technical advice on the spot.

If Greece establishes peace and stability within her own borders and the measures recommended are vigorously carried out, then, the report says, there appears to be no reason why the country should not be able to double or treble the pre-war income within the next two to three decades.

TOPDRESSING FIRST DEVELOPED IN CAMBRIDGE DISTRICT

"The flat country round Cambridge had a hungry look in 1864." A solitary clover plant inspired confidence in the district. Cambridge farmers developed topdressing partly because they had heard about the Rothamsted experiments, but mainly because they had to.

TOPDRESSING

By J. M. MILLER, *Rural Development Division, Auckland.*

THE development of the meat and dairy export industries brought about by the introduction of refrigeration was described in the previous article in this series. The present article deals with a no less important aspect of the development of these industries—the practice of topdressing grassland with phosphatic fertilisers. The history of topdressing is the history of Waikato farming, for it was in the great middle basin of the Waikato River that soil, climatic, and marketing factors forced farmers to adopt, with the aid of topdressing, intensive grassland farming on soils which would not naturally carry milk-producing pastures.

UNTIL the beginning of this century topdressing was not recognised as a general grassland management practice which would enable high-class pastures to be produced on poor land. For about a hundred years previously current thought and literature on farming had been directed toward extending the use of concentrated fertilisers—ground bones, then superphosphate and the guanos—for increasing the yield of crops, including the hay crop, but specific knowledge about the action of phosphates on the growth of clovers, and the action of clovers on the growth of grasses, and the fact that the whole process could often eliminate the distinction between good land and poor land, was a long time coming.

In this country it was apparently a coincidence that while one group of men were talking about the refrigerated transport of perishable animal foodstuffs, another group were independently working out the cheapest means of producing those foodstuffs—namely, from topdressed pasture.

The group of Waikato farmers who first developed topdressing were men of unusual curiosity and enterprise, and their achievements and failures in the fields of co-operative dairying and the reclamation of scrubland and swamp land were scarcely less notable than in that of grassland improvement; but the historical record reveals that their remarkable joint effort which overcame the difficulties of Waikato farming was forced on them by circumstance. It was as if Nature had said, "Topdress or perish," and they had decided not to perish. The Cambridge settlers developed topdressing partly because they had heard of the Rothamsted experiments, but mainly because they had to.

THE WAIKATO

The Waikato region was first authoritatively described by Dr. F. von Hochstetter (1), who toured the pumice country on foot and by canoe in 1858. Climbing to the top of Taupiri Mountain, and looking south, he beheld "an extensive lowland spreading into distant mountain cones and remote mountain chains . . . glistening (with) numerous lakes and the serpentine currents of large rivers." He called it the Middle Waikato Basin, and identified its limits by the mountains Pirongia, Maungatautari, Te Aroha, and Taupiri. Later measurements showed it to have an area of about 8000 square miles or 5,000,000 acres. It is now called simply "the Waikato," and includes wholly or in part the counties of Waikato, Waipa, Piako, and Matamata. The eastern half of the basin is drained by the Waihou and Piako Rivers, the western half by the Waikato and Waipa Rivers. The Waikato and Waipa Rivers meet at Ngaruawahia, enclosing a triangular piece of land which was formerly called the "delta" and is now Waipa County.

The rivers run through sandy pumice terraces and plains formed from material washed down after the last great volcanic eruption in the Taupo district. Away from the river margins the plains tend to subside into vast peat bogs, or to rise into clay downs and hills. Except for some cabbage trees and patches of kahikatea bush, the region was devoid of forest, but many of the bogs contain the remains of large trees destroyed ages ago by fire or by a rise in the water-table. The pumice plains were covered with tall manuka and scrubby bracken, the clay hills with a mixture of bracken, tutu, koromiko, and small manuka (2). On the brown clays of the "delta" luxuriant bracken had built up a thin layer of black humus, while primitive Maori agriculture had improved some of the river terraces through the application of wood ash, but there was none of the accumulated bush and tussock fertility which gave farming a good start in other regions.

The land was shared by the Arawa and Waikato tribes, the Arawas owning the part east of the Waikato River in the direction of Rotorua and the Waikatos owning the "delta" region as far back as the Puniu River behind Te Awamutu. At the time of Hochstetter's visit the Waikatos had evolved a prosperous Eropean style of agriculture under the enthusiastic supervision of the Rev. John Morgan, the Anglican missionary at Te Awa-

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Illustration on opposite page from photograph by V. C. Browne.

mutu. (Hochstetter's description of the Te Awamutu agriculture was given in a previous article in this series, "Subsistence Farming.") A year or two afterward Morgan was swept away in the turmoil of intrigue which developed into the Waikato War, and nothing remained of his work except the clover plants and the peach trees which he had propagated throughout his district. He used to carry a saddlebag filled with clover seed and pierced with a hole through which the seed trickled as he rode (3). The prevalence of red clover in the Waikato led to its adoption as a staple fodder crop by the first European settlers. The Waikato also became noted for its groves of wild peach trees, but these were destroyed after 1880 by an epidemic of leaf curl and die back.

As a result of the war of 1863-64 the delta region changed hands, being mostly divided out among the military according to the promise of the Government during the recruiting campaign. "The acquisition of the valley of the Waikato was a great thing done," said Anthony Trollope, the English novelist, who came round in 1872. "The Natives, by the Treaty of Waitangi, had been declared to be the owners of the land, and the difficulty in buying land from them was great. There was trouble in getting it from them unfairly—more trouble in getting it fairly. But acquisition by war settled all this." Trollope's summing-up is mercifully realistic and covers a multitude of sins.

The fruits of victory proved to be generally disappointing. The amount of good land acquired by confiscation was found to be very small. The Arawas got their land back as a reward for changing their allegiance from the Maori king movement to Queen Victoria, but it was not fit for agriculture. Nor was the rest much better. Andrew Kay, a Scottish storekeeper of the period, wrote that "the flat country land round Cambridge had a hungry look in 1864, being covered with short, stunted fern, and was generally considered barren and worthless.

"One fine spring morning William Buckland called all hands to a spot in front of the National Hotel, just about where the War Memorial now stands. He had discovered a solitary plant of clover. It looked quite healthy and was much admired. This find helped to instil some confidence in the district." Nevertheless, "of the eleven hundred emigrants who came to Cambridge in 1864, there were only fourteen actually on the land at the end of three years" (4).

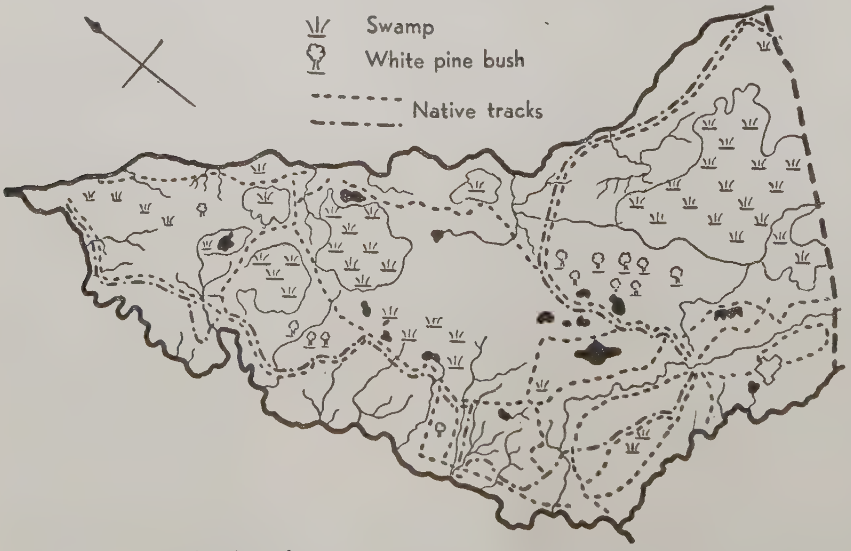
Anthony Trollope found in 1872 that the delta region had been completely transformed. "The military settlers have not generally succeeded as farmers in New Zealand," he wrote, "but the general process has been successful. After a short period of occupation the old soldiers were enabled to sell their lands, and have very generally done so. The purchasers have gone upon it with true colonising intentions, and now the upper part of the Lower Waikato, and the valley of the Waipa which runs into it, the districts around the new towns of Cambridge, Alexandra (Pirongia), Hamilton, and Newcastle (Ngaruawahia) are smiling with English grasses" (5).

Farming Development

For some years after the victory over the Maoris there was a state of tension in the Auckland Province, and military outposts were maintained at Cambridge, Kihikihi, and Pirongia. The few small settlers who did not sell their land were those who succeeded in obtaining Government contracts for the supply of chaff, potatoes, meat, etc., to the armed constabulary. But the remnant of the Waikato Maoris, who had found sanctuary with the Ngatimaniapoto tribe in the King Country, did not venture outside the confiscation boundary, though they remained sullen and hostile and not only prevented the erection of telegraph poles on their territory, but actually shot a surveyor who was engaged on that work. So the colonists were able "to assume the power of conquerors," as Trollope put it, and use the land as they thought fit.

Two influences guided the development of the Waikato—the farming influence and the speculative influence. After the military settlers sold out, their holdings were largely aggregated by the new owners into grazing properties of 250 to 1000 acres divided by post-and-rail fences into large paddocks on which sheep and cattle were fattened. The aim of the owners was gradually to introduce the English system of mixed arable farming, but what spoiled their aim as much as anything was the fact that the available farm labourers were of a type which had left England to escape from that system.

Twelve years after the war the editor of the "Waikato Times" remarked that the large majority of settlers followed the rough-and-ready colonial system where grass, sheep, and cattle were the rule, and the crop, whether root or cereal, the exceptional departure. "As a matter of safe speculation," he went on, "it is far more profitable for a man to buy five hundred acres, even though he can only roughly work a hundred, and wait till the increased value of the whole enables him to sell out at a profit, than, instead of buying the extra four hundred acres, to apply the capital to the thorough working of the farm . . . Those settlers who have made money have made it from the sale not of produce but of the land itself." The following year (1878) he referred to the sale of 260 acres between Hamilton and Cambridge at £15 an acre, and added that "everywhere throughout the district land whether improved or unimproved is on the rise, and what four or five years ago could have been purchased for £2 to £4 cannot now be obtained for less than treble the money. . . . there is good reason to believe that . . . land has a far higher price to go before it reaches anything like a fixed standard of value. . . . The soil has met its liabilities fourfold" (6). That last remark was straight-out propaganda in favour of specula-



Waikato Delta showing the area at the junction of the Waikato and Waipa Rivers; after map drawn by Colonel Mould, R. E., from Military Surveys, 1864.

Waipa County looking toward Pirongia Mountain.

tion. That the land could not stand a value anything like £15 an acre was afterward disastrously proved.

Farm Production

Nevertheless there were many farmers who, although they indulged in land speculation as a sideline, were not prepared to sell the home farm. A thousand or so acres of flat, free-draining soil on the bank of the Waikato River provided a good place to live, and as long as the rivers were the main traffic arteries, it was the best proposition too. The names of some of these properties—Tamahere, Fencourt, Pukerimu, Pukekura, etc.—are perpetuated as names of districts in the Waikato today.

For the first 10 or 12 years the income of Waikato farmers was derived from the sale of fat stock in Auckland. The cattle were either driven to Thames and shipped by sea from there, or shipped by river to Mercer and driven from there. After 1875 cattle could be railed from Mercer, after 1879 from Hamilton, and after 1884 from Morrinsville and Cambridge. By 1875, however, Waikato stock was being undersold on the Auckland market by Taranaki. There were several reasons for this. In the first place Taranaki farmers had a fertile brown forest loam to work with; secondly, they could ship directly from Waitara to Onehunga; and thirdly, the Waikato pastures were running out. Willy-nilly the Waikato was forced into mixed cropping, with a rotation of potatoes, cereals, roots, and new grass. But the idea that it ought to be pre-eminently a grazing region, where men could "sit down at their ease and see the grass converted into beef and mutton" (6), never died out. No doubt the climate and the growth of grass round stockyards and gateways encouraged this view.

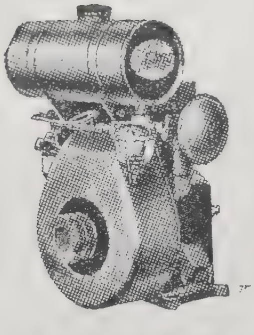
For the next 20 years the English system of farming prevailed in the delta region, though in a modified form. During most of this period, from 1880 till 1895, the country was in the depths of a severe depression, and consequently there was a pool of unemployed men from which labourers could be drawn. That these men were a good deal different from the English farm labourers is evident from a passage in the "Waikato Times" of 1881: "The days when the farming man, if he kept sober on his eight shillings a week pay for forty years, and brought up a large family respectably without parish aid, and never omitted attendance at church on Sundays, and always took off his hat and respectfully touched his forelock to the squire and parson and all God-appointed magnates . . . those days are gone. . . . The farmer with a few years of independence and good education, out here, offers a wonderful contrast to the old chawbacon, even as a labourer, and is sharper and shrewder, and perhaps harder and more selfish in his dealings with his inferiors, than any of his former masters." When the dairy industry became established and the cropping farms were cut up such men became the first generation of "cow-cockies."

Another modification of the English system was that artificial manures—rock phosphate, guano, superphosphate, and bonedust — were used instead of farmyard manure. Although the cattle were fed on the roots and the crop residues, they were not stalled or penned, and hence there was no accumulation of "muck" for ploughing in with the crops. At the same time there was no conservative opposition to the use of artificial manures, whose only drawback was that they had to be bought for cash and were very dear (£8 to £10 a ton f.o.b. Auckland). From 1876 lime from the Waipa quarry, where the stone was burnt with manuka, could be had for thirty shillings a ton through the Waikato Steam Navigation Company, who would dump it at the nearest river landing.

As a result of the fertilising of the crops the pastures improved so noticeably that it became the practice to lay down grass seed with fertiliser too. An entry in the "Waikato Handbook," published in 1880, records that "last year a 28-acre old grass paddock (on Douglas's 1000-acre farm at Tamahere) was ploughed in spring, cross-ploughed in February, topdressed with 2cwt. of Mexican guano per acre, and sown with 16lb. of grass and clover and ½lb. of turnip seed to the acre. It was sown early in March with a drill, saving one-third the seed as between sowing broadcast. It wintered 800 sheep, and the grass has now met in the drills, though in September Mr. Douglas was rather doubtful about it, thinking that the sheep had trodden the grass too much. However, it has turned out well, and is certainly a cheap way of renewing an old pasture and at the same time taking a turnip crop" (7).

With the establishment of a mixed cropping system the appearance of the countryside changed from a bare expanse of poor grass. Paddocks were subdivided and crops fenced off from stock with ditches, dikes, and hedges. English trees were planted for shade and for sentimental reasons. Ploughmanship improved and ploughing matches were held. Wire fences were adopted slowly, as wire was dear; barbed wire, invented in America in 1879, was £46 a ton in Auckland in 1882.

The mixed cropping system was only a passing phase, however, for it was displaced by dairy farming as soon as the combination of refrigeration, dairy factories, topdressing, and milking machines made the one-man dairy farm a commercial possibility and opened the way to the purchase of land by farm labourers. The change-



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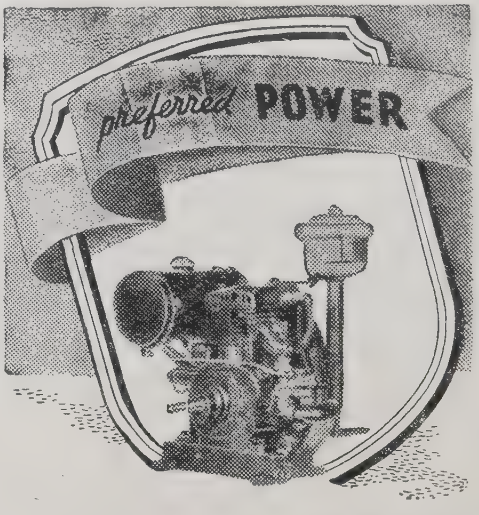

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over was hastened by the cutting-up of enormous blocks of grassland in the eastern portion of the Waikato Basin. The history of this grassland belongs to the "extensive" phase of Waikato farming, which was going on at the same time as the delta farmers were trying to evolve the English system, and which arose out of the speculative aspect mentioned earlier as being one of the two main influences affecting the development of the Waikato.

The Bad Times

During the great depression of 1880-1895 strenuous efforts were made by Waikato farmers to keep farming profitable. They were being squeezed in two ways—by falling prices and by soil exhaustion. In other parts of the North Island "bush-burn" farming was progressing on a grand scale, but hostile Maoris to the south and bush sickness to the east effectively prevented the settlement of both the King Country and the Patetere Plateau (Mamaku Hills). The Waikato was a dead end.

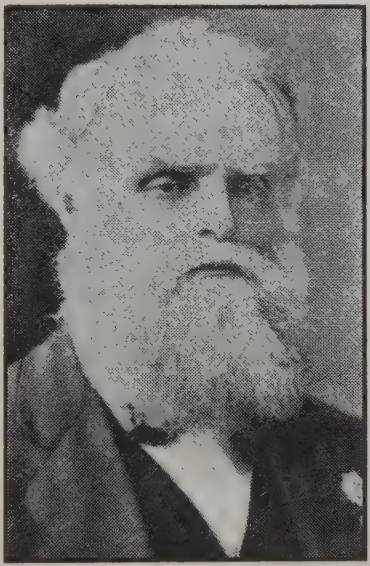
An attempt was made to meet soil exhaustion by improving farming methods, notably by growing swedes and turnips with the aid of manures in an effort to have fat stock ready for the market in winter as well as summer. Farmers tried to avoid the peril of falling prices by diversifying their farm produce and by "eliminating the middle men" through co-operative enterprises. Fruit, tobacco, and sugar beet, which were suggested as alternatives to meat and wheat, all failed. The Cambridge Farmers' Club proposed that to encourage barley growing it should be illegal for brewers to use sugar for brewing, but the Government took no notice. Wheat, which is usually a reliable crop, was quite unreliable during this period, falling from about 8s. a bushel in 1877 (during the Russo-Turkish War) to 2s. 8d. in 1887. In 1887 the Waikato grew its largest crop (8000 acres), but the acreage declined rapidly in succeeding years, the reasons being, according to "Brett's Almanac" of 1894, "the absolute necessity of using large quantities of manure for cereal crops, (and) the uncertainty of our local markets, which rightly or wrongly it is generally thought are worked by rings against the farmers' interests, so that the producer never has any idea whether his crop, however good it may be, is going to pay him or not" (8).

In 1882 the North New Zealand Farmers' Co-operative Association, Limited, established to build an abattoir and freezing works and engage in retail butchering and general merchandising, set up its headquarters in Auckland to "meet the business men on their own terms" (6). In a few years it was suffering from cut-throat competition and from a bad habit of buying businesses from its directors, and in 1887 it was wound up amid general lamentation. Great things had been expected of the co-operative movement, but, as one of the liquidators said, "if we seek protection from the Auckland middle man, it is not the wisest thing in the world to rush into his arms" (6).

Henry Reynolds opened his Pukekura creamery in 1886 and started making "Anchor" butter. In 1892 he had eight factories and in 1895 dairying was second in importance to meat production and the depression was over.

Josiah Clifton Firth

After the conclusion of the war against the Waikato Maoris the way was opened for the purchase of land from the Arawa tribe, the "friendlies" (5), whose possessions stretched eastward from the Waikato River toward Rotorua.



[By courtesy of Clifton Firth Ltd., Auckland.
J. C. Firth.

The first man to take advantage of the situation was Josiah Clifton Firth in 1865. "The passing of the Native Lands Act was the first step taken to open up the unconfiscated portion of the Maori lands. Firth here saw his chance, and he began negotiations with William Thompson (or Wiremu Tamehana, the Te Waharoa chief) for the Matamata country . . . Men smiled, for it was commonly said that at Matamata 'Fern is King,' but this in a short while might have been changed to 'Firth is King,'" (9).

J. C. Firth was the prototype of a small group of men who represented a large amount of Auckland and London capital seeking to be invested. The investment of this capital in land initiated an era of speculation which ended disastrously in the great bank crash of 1895. But such a bald statement does not do justice to the situation, which had its constructive side as well.

Firth was an educated Englishman who had founded the Wharf Steam Roller Flour Milling Company in Auckland before 1860. The mill prospered and he participated in public affairs. He was a handsome, attractive, and energetic man, and acquired a strong following. His name crops up in accounts of nearly every colonial activity—acclimatisation, afforestation, secular education, the eight-hour day, gold-mining, flour-milling, kauri gum, municipal and provincial politics, land settlement, and even literature. For a time he was a director of the Bank of New Zealand and the New Zealand Loan and Mercantile Agency Company Limited. He was a born publicist and an object of suspicion to those of his colleagues who preferred to work in the dark.

Firth's plan on acquiring Matamata was a grandiose one. He had acquired the freehold of about 50,000 acres of easily ploughable scrubland which he proposed to turn into a "bonanza" wheat farm similar to those described in a previous article in this series. The wheat would be carried in his own ship down the Waihou River, which ran through his property, to the Firth of Thames, and thence by sea to his Auckland flour mill. To do all this he had to clear the land, fence it and grass it, stock it with cattle to improve it, sow, harvest, and thresh the wheat, store it, erect homes and buildings and a wharf on the river, build a ship, and finally clear the river of snags for 60 miles. Yet when he had done all this it was not enough. A "missing link" in his plan made it unworkable.

Matamata

A description of the Matamata Estate in 1880, when it was at the height of its productivity, is to be found in the Piako County Council's diamond jubilee publication (9). It was evidently a remarkable sight. A grand avenue 23 miles long led completely through the estate from the Waikato River to the landing on the Waihou. Double gateways 20ft. wide led into paddocks a mile or a mile-and-a-half square containing wheat, red clover hay, Lincoln and Shropshire sheep and Down-cross hoggets, and Shorthorn and Hereford cows and steers for cheese and beef production. There were also an apiary of several hundred hives, pine groves in which deer were running, a racetrack for the employees, and an armed fortress. In 1881 seven miles of telephone wires were erected. In 1882 the implements included 8 reapers and binders, 13 mowing machines, 10 drills, 10 Cambridge rollers, 10 rakes, 2 manure distributors, 11 disc harrows, several hay loaders, 2 portable steam engines, a scoop, and a grader. In the 1881-82 season the estate produced 35,000 bushels of wheat from 1400 acres, 3500 acres of clover hay, and 1400 acres of turnips, while 4000 cattle and 7000 sheep were grazing in the fields.

The missing link in the Firth plan was phosphatic fertiliser. His cattle were not very efficient fertiliser factories and sometimes had to be expensively hand fed (9). In 1884 Firth gave up wheat growing after losing two seasons' crops. Opinion was expressed that the harvesting was bungled (6) because Firth tried to direct operations from Auckland instead of trusting his manager, but wet weather was probably as much to blame. He could buy wheat from Canterbury more cheaply than he could grow it, but he had sunk about £200,000 in Matamata, some of which was borrowed, and he was now pinched for cash. In 1886 he offered to sell dairy farms and to finance them and establish a cheese factory, but because of the low price for dairy produce few of the farms were taken up. "An attempt to foster the dairying industry by establishing a condensed-milk factory was a failure because the mortgagees foreclosed although everything was in working order for a start" (9).

In 1889 Firth went bankrupt. "Mr. Firth, who was indebted to the Loan and Mercantile Agency Company, ground up all the wheat he had in stock. He had, however, no money to provide a fresh supply, and the Loan Company declined to advance him any further credit for that purpose" (10). "The story of his fertile ideas, his great executive ability, his humanitarian principles, his rise to wealth, and his eventual failure . . . is one of unsurpassed interest in the colonising history of this country" (9). Firth died in 1897, but before his career ended he founded another enterprise, the Firth Pumice Company, for the supply of insulation to the refrigeration industry.

One of Firth's managers at Matamata, John McCaw, a man of importance in the history of the Waikato, is mentioned later in this article in connection with the Bank of New Zealand Assets Realisation Board, of which he was made superintendent.

The Estates

Other well-known men who bought land from the Maoris were Thomas and Samuel Morrin, ironmongers, who founded Morrinsville, and Thomas Every MacLean, who for a time was Provincial Superintendent. By 1875 numerous large estates in the eastern part of the Waikato included Lochterbie, Waharoa, Paeroa, and Okoroire. They were partly broken in and farmed to attract settlers, but the depression came on, and instead of being cut up and sold, they fell into the hands of the financial institutions to whom they were mortgaged.

There is a description of them in the jubilee publication of the town of Te Aroha. "These estates," says a contributor, "represented the most picturesque stage of agricultural life in the Thames Valley. They were highly organised with specialised staffs. The owner or manager, with the employees, formed a little community, largely self-contained. There was a roomy homestead with cottages for ploughmen, shepherds, and stockmen. Tradesmen such as blacksmiths and saddlers formed part of the staff. A full range of the best agricultural machinery available was used and everything was done on a big scale."

He points out that the general farm practice was conditioned by one all-important consideration: the failure to establish permanent pastures. "In breaking in the virgin land the dry knolls and levels were ploughed, fallowed through the winter, and worked up for spring sowing of cereals, root crops, or pasture. Pastures had to be maintained for the needs of the beef cattle and sheep. The short life of these pastures compelled the adoption of a cropping rotational system. When grass was sown in the ashes after the burning off of the scrub, the strike usually was excellent and the first season a good bite of feed was thrown. The second year saw a waning of the growth, the sole opening up with white clover more abundant than grass. By the third season the pasture was returning little useful feed and was again ready for the plough" (11).

Some of the estates were established on swamp land, but these fared no better, although much labour and money was spent on draining them. The pastures, after an initial flush, ran out to Yorkshire fog and sweet vernal. In some cases they were over-drained, but mostly the failures were due to the poor nature of the peat, which required heavy liming, which was impossible in the absence of roads solid enough to support loaded wagons.

The Land Companies

In the years 1875 to 1895 occurred the rise and fall of the big land companies which were set up by the mortgagees and into which the estates were gradually merged. These were the New Zealand Thames Valley Land Company (also known as the Patetere Company), the Waikato Land Association (the Waikato or Piako Swamp Company), the Auckland Agricultural Company (involving Dalgety and Company), the Bank of New Zealand Estates Company, and the Estates Branch of the New Zealand Loan and Mercantile Agency Company. Confounded by a depression of unprecedented length and severity, they extended their farming operations to secure some return on their investments, which were quite unmarketable. In a spirit of desperate optimism they faced the future, but each year proved worse than the one before. Eventually they were forced to carry little but sheep, which required the least labour and which increased from about 100,000 in 1890 to 400,000 in 1894 (8).

By 1895 the Bank of New Zealand, whose head office oscillated between Auckland and London, was carrying not only its own Estates Company, but the other land companies as well, and the load was too great. The bank appealed to Parliament. As it was a question of saving the bank, no matter how closely it was associated with the companies, emergency legislation which made the Government the largest shareholder in the bank was passed overnight (12).

The upshot of the speculative phase was that a Bank of New Zealand Assets Realisation Board, consisting of two members appointed by the bank and one by the Government, was set up to administer and dispose of the properties. John McCaw, who had been J. C. Firth's most successful manager, was made superintendent. At an ever-increasing rate the land was cut up and sold, with the assistance of the Crown, to the increasing numbers of dairy farmers, until by 1904 the last of it was gone. It sold for £3 to £4 an acre, which had been about its value in 1870 before the boom started.

In spite of themselves, the "companies and moneyed individuals" had done much useful work in clearing the scrub, draining the swamps, establishing pretty little settlements, and providing casual and contract work for many struggling settlers at a time when there was very little money about. "They have, as it were, prepared the way for settlement, and given it an impetus, and had it not been for their interference, the many hundred thousand acres which are now in grass would have remained to this day and for many years to come a barren waste" (6).

The lecture room of the old Cambridge Farmers' Club building in Duke Street, now used as a board room by Federated Farmers and other bodies. The Club flourished for only seven years, but had an enormous influence on the future of the Waikato and of New Zealand. The portraits round the wall include those of Richard Reynolds, James Runciman, Joseph Gane, John Fisher, and George Clark, all foundation members.

However, this grass, though certainly more productive than scrub, consisted chiefly of catsear, fog, danthonia, chewings fescue, sweet vernal, trefoil, and creeping bent; while "hundreds and hundreds of absentees' lands lay waste, not only producing nothing, but in too many instances propagating furze, sweet brier, and other such nuisances" (8).

Pasture Establishment

It might be baldly stated that Waikato farming was a dead-end occupation until a means was discovered of establishing and maintaining good permanent pasture. The fact that eventually such a means was discovered is therefore of outstanding importance.

In its technical aspect the problem was one of selecting desirable pasture species and of providing a suitable environment for them. Red clover was the first of the desirable species to establish itself. It would not stand hard grazing, but was eminently suitable for a hay crop, and when used only for that would last ten years or more. It was often sown alone, or with cocksfoot in the ashes of a scrub burn in February; the following spring cattle were turned in on the luxuriant growth and, while feeding on it, crushed out the second-growth fern which invariably came up. After that the ground could be ploughed and resown.

The preparation of the ground for pasture depended a good deal on the amount of manuka which was mixed with the fern. Solid fern would give a clean burn which could be ploughed immediately if necessary, say for a turnip crop, but manuka of any size or thickness had to be cut up by hand for a clean burn, or else killed by a scrub fire and allowed to rot before the teams could get the plough through the ground. Scrub cutting was a real bugbear, especially for the settlers' sons, and MacLean's "patent tea-tree cutter," a horse-drawn machine hopefully but ineffectually introduced in 1884, aroused as much interest as the giant discs did 50 years later. As for the method of cultivation, it was soon found that the light land, with its thin topsoil, was best ploughed not more than 4in. deep, and heavily rolled. The light ploughing brought the double-furrow plough into popularity.

In 1878 Auckland merchants were advertising red, white, alsike, and crimson clovers; lucerne, timothy, sainfoin, yarrow, birdsfoot trefoil, ribgrass, sheep's parsley; ryegrass from Poverty Bay, Canterbury, and Pukekohe; cocksfoot, prairie grass, Indian doob, machine-dressed ratstail; *poa pratensis, poa trivialis, poa aquatica;* sheep's, hard, and meadow fescues, and crested dogstail, sweet vernal, and meadow foxtail. Although few of these were widely used, those species which the soil suited were soon widespread, no matter what mixture was sown.

Ryegrass was of course the favourite with the majority of farmers, while Dutch white clover was introduced as early as 1871. The superior nutritive value of ryegrass-white clover pasture was known from English experience, and every endeavour was made to get it going. The results were variable, but generally disappointing, and gave rise to a "ryegrass controversy" which was settled after the turn of the century by comprehension of the phosphate-clover-nitrogen-grass cycle and the discovery of "false perennial" ryegrass as the troublemaker.

The Ryegrass Controversy

From the annals of the Cambridge Farmers' Club, as recorded in the "Waikato Times," it is possible to reconstruct a scene from the ryegrass controversy. In this scene, which is part of the discussion which followed an address by one of the members, the argument is conducted on a gentlemanly level, but the conflict of opinion is quite evident.

The scene opens with John Runciman agreeing with many of the views put forward by the speaker, but announcing flatly that there were others to which he could not subscribe. "For instance," he said, "I am and always have been of the opinion that ryegrass will grow on new land equally well with old, and I have proved it. Those who have failed to grow it are themselves to blame for not using the proper implements. The failure in the grass is not owing to the state of the soil, but simply to the want of sufficient rolling. When I first came into the district I grew some splendid ryegrass on new land. Most people put too little seed into the ground; I have always put 20lb. I have never sowed a pound of cocksfoot, but have kept to the ryegrass, and with the most successful results."

Mr. Williams: My experience has led me to think that the land takes ryegrass too freely, to the exclusion of clovers, which are smothered when the ryegress is thickly sown. Consequently, when the rye goes out the pasture is done. Anything like 15 or 20lb. of ryegrass is too much. You might get a good pasture for a few years, but you'll suffer in the end. The less we have to do with ryegrass in the laying down of new lands, the better.

Mr. Walker: I don't think the getting of a good pasture is so much a matter of seed as the preparation of the land —getting a thoroughly good seed-bed. It is well known that only 50 per cent. of clover buried half an inch comes up, and of seed buried an inch and a half very little, if any, ever germinates at all. The same remark applies to grasses as well.

Mr. Martyn: When I first came to the district I sowed nothing but clover. Then Mr. May strongly advised me

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to put in a few pounds of ryegrass. Now the paddocks have an excellent sole of grass—when they are not covered with thistles. (Laughter.)

Mr. Clark: Seven pounds of ryegrass to the acre is as good as 20lb. If the land will grow ryegrass, 7lb. is ample; if it will not, then it is so much the less seed thrown away.

John Fisher brought the argument back full circle by saying that he remembered seeing Runciman's crop, which Runciman said he had properly rolled. "Yet the same season," he went on, "I put in ryegrass on new land, and it was certainly not for the want of rolling that it turned out a failure, because I rolled it with a heavy implement more than once." Then he started on a new line. "I think it's insects," he said. . . .

Cambridge Farmers' Club

It would be difficult to overestimate the influence of these men. In the space of seven years they determined the future of the Waikato—a future which, until 1947 at any rate, was to be one of permanent pasture grown from reliable seeds, maintained with topdressing and proper management, and converted into milk for the manufacture of dairy products and the fattening of pigs and lambs. To a great extent, of course, they were driven by necessity, and they were soon to have their philosophy shattered by an economic crisis of the first magnitude, but they kept their wits about them for long enough to get their ideas propagated. These ideas were derived from the latest English information regarding the grand march of nineteenth century research in its relation to agriculture.

In 1875, when there was a general feeling that agriculture in the Waikato was still only tentative, a number of prominent farmers in the Cambridge district began to meet once a month in one another's houses to "talk shop." Some had been officers in the militia, some were estate managers, others combined business interests with farming, and some were just good plain farmers and breeders. Incorporating themselves into a club, they arranged farm inspections, ploughing matches, and shows; managed campaigns against such natural calamities as peach leaf curl, sheep scab, and bovine pleuropneumonia; built a kauri clubhouse costing £800; entertained important travelling personages; became exclusive and unfinancial; squabbled, and, in 1882, broke up (6).

They had a rule that any member could be called on to prepare and read an essay on some aspect of farming. In practice this devolved on the founding members, among whom were Henry Buttle, J. P. Campbell, G. E. Clark, R. H. D. Ferguson, John Fisher, Joseph Gane, — Hicks, R. Parker, Henry Reynolds, J. C. Reynolds, Richard Reynolds, Capt. James Runciman, E. B. Walker, — Williams, and Major John Wilson. Their essays were informative and authoritative, and became widely known, being reprinted in the "Waikato Times" and sometimes in the Auckland papers and the "N.Z. Country Journal."

Among the topics raised were "co-operative dairy factories" in 1876 and "topdressing of grass" in 1880. The first subject, by James Runciman, aroused a lot of comment to which the newspapers gave prominence. It was typical of the Cambridge men that they were not afraid to turn words into deeds, and in 1878 Runciman opened a private cheese factory on his farm at Hautapu. It was followed by several co-operative cheese and bacon factories, at Te Awamutu and elsewhere, but because of poor facilities and transport, none of them flourished. However, James Runciman's example was taken up by a fellow club member, Henry Reynolds, who started a successful chain of creameries in 1886, selling out to the Auckander Wesley Spragg's New Zealand Dairy Association 10 years later. Thus organised, dairying became profitable, and topdressing and refrigeration hastened its growth, culminating in the formation of the New Zealand Co-operative Dairy Company in 1919.

Richard Reynolds, Cambridge Farmers' Club.

Topdressing developed much more obscurely. On March 22, 1880, in a lecture entitled "The Culture of Grasses," Major John Wilson drew the attention of the club to the fact that, while manure is largely used in mixed arable farming to produce greater abundance of grain or roots, "grass seems by common consent to be left to itself, to succeed alone, or it may be struggle through under every disadvantage. . . . In some poor and stiff soil manure is an absolute necessity, soil such as is seen in many parts of Kaipara and almost everywhere on gumfields. . . . And on any, whether good or indifferent, a supply of some such stimulant is at once observable in a more luxuriant vegetation." He then read an account of an experiment at Rothamsted Experimental Station, England, on the topdressing of grass plots, and how the struggle for existence was altered in favour of the higher-producing grasses, which increased in number, while the herbage became simpler. Finally he observed that "on the finest old pastures manure judiciously chosen exerts a most powerful influence, doubling and trebling . . . the already exuberant vegetation, and it is equally noticeable that an application of this stimulant fairly extirpates weeds" (13).

Topdressing

It was not until 1908, when the Department of Agriculture published the results of its first topdressing trials at Ruakura and Te Kauwhata, that the principle of topdressing began to excite interest among farmers outside the Waikato. What had happened in the 28 years since Major Wilson's lecture is difficult to ascertain, but enough of the old gossip is still in circulation to furnish the inference that topdressing was regarded with derision by those who had no need to do it, and with shame by those who did.

There is some reason to believe that John Wilson did first moot it, and that Richard Reynolds may have been the first to try it out. Wilson was not a farmer, but lived as a retired gentleman at Cambridge. He had taken up 400 acres adjoining the camp of the Imperial troops at the Pukerimu River landing, but had sold it to a man named Comrie, who later sold it to Richard Reynolds (4). Reynolds is reputed to have been very progressive and businesslike and willing to try anything. It is said that once after a visit to Hawke's Bay he laid down part of his farm in tall fescue, and had to plough it up again. Years later, in 1913, he came back from a trip to America full of the importance of lucerne, only to see from the window of the train a fine stand at Ruakura, upon which he handsomely complimented the manager, Primrose McConnell (4).

EARLY TOPDRESSING TRIALS

BIG HILL FIELD—RUAKURA

In 1904 the pasture on the Big Hill Field consisted mainly of danthonia and sweet vernal with a small proportion of cocksfoot, Yorkshire fog, and white clover. This old pasture was disced, harrowed, and topdressed with 2cwt. of basic slag. Thirty-three acres were over-sown with cocksfoot, timothy, and red clover.

In 1905 the pasture received 2½cwt. of basic slag and 2cwt. of superphosphate in August and a further 2½cwt. of slag in June, 1906. The dressings of slag developed white clover growth and this in turn was reflected in a much better grass growth, and in 1907 the pasture was described as follows:—

"Predominating grasses—cocksfoot, ryegrass, sweet vernal, white clover, danthonia, and Yorkshire fog, weeds — hawkweed, dandelion, and sorrel."

The results obtained from slag topdressing of this field were so outstanding that they were of considerable importance in influencing farmers to adopt slag for general topdressing purposes.

Above—Sir William Somerville, Director of Cockle Park, Northumberland.

Left—TREE FIELD, COCKLE PARK, NORTHUMBERLAND, the most famous slag field in the world. Experiments with slag were started there in 1896 and are still carried on.

Cockle Park Experimental Station, Northumberland.

Reynolds, Martyn, Clark, and other members of the club were careful experimenters with manures for crops on a unit cost basis, reporting their results to the club from time to time. Topdressing started hesitantly in the Cambridge district in the eighties (2), the seed drills being used as distributors. Its early progress was delayed by a baffling feature which arose from the cautious manner in which those who first tried it would topdress only part of a paddock, to be sure that the topdressed part was better than the untopdressed part. Curiously enough, it was usually worse, the grass on it being only a few inches high while the rest was knee high and going to seed. This is said to have been a common experience. It was not realised for some time that the stock were eating the topdressed grass and leaving the rest. Topdressed paddocks automatically became understocked.

In the nineties the practice spread further afield. "Some beautiful green paddocks were to be seen from the main road in passing through the Morrinsville district, and it used to be a mild joke to suggest that those Morrinsville farmers, anxious to sell their hungry farms, had sprinkled some bonedust over their front paddocks" (11). About 1900 John McCaw, then Superintendent of the Bank of New Zealand Assets Realisation Board, began topdressing at Matamata with 1½cwt. to the acre, in order to prolong the life of the pastures whose persistent running out seriously interfered with the grazing management (9). This was contrary to the advice of the Department of Agriculture whose recipe for the Matamata County was "a combination of gorse, kept under control by stock, together with . . . some selected grasses (such as . . . chewings fescue and *danthonia semi-annularis*)" (14).

Scientific Background

As is often the case, practical men gave the clue to the experts. The same thing had happened in England, where the Cheshire farmers who used crushed bones on old grass at the beginning of the nineteenth century had started the investigation which resulted in the invention of superphosphate by J. B. Lawes in 1842. In 1843 Dr. Justus von Liebig applied the economic law of the minimum to agriculture, stating that "by the deficiency or absence of one necessary constituent, all the others being present, the soil is rendered barren for all those crops to the life of which that one constituent is indispensable."

In 1856 Lawes set apart about 8 acres of grassland in his park at Rothamsted for investigating the comparative effects of different manuring substances on permanent grass—"in the first instance, probably to determine the best means of increasing the gross amount of produce. But not only has the general character of the herbage as to vigour, colour, date of ripening, etc., materially altered, but the composition of the produce has entirely changed. . . . No fresh seed has been artificially sown within the last fifty years certainly, nor is there any record of any having been sown since the grass was first laid down" (13). The dominance was shifted from sheep's fescue to cocksfoot.

The history of basic slag as a commercial product began in 1879 with the successful demonstration of the Bessemer process of steel-making at Durham; while in 1886 Hellriegel and Wilfarth in Germany discovered the fact that clovers could extract nitrogen from the atmosphere. These two discoveries were amalgamated by Sir William Somerville, Sir Thomas Middleton, and Professor Douglas A. Gilchrist at Cockle Park, Northumberland, in a series of experiments which began in 1896.

Somerville determined the superiority of basic slag over other manures for renovating poor grassland on heavy clay soil. He used sheep to measure the productivity of the pasture. "Hitherto in grassland experiments the values to be attached to various improvement methods were assessed by the extra weights of hay produced" (15). Realising that this did not necessarily measure the quality of the herbage, Somerville used live-weight gains to assess the results. He decided that the improvement in productivity was largely due to the appearance of wild white clover, which was the only new plant to come in. He also found that the application of lime doubled the calcium intake of the herbage plants.

Somerville worked with 3-acre plots, which were criticised as not being the usual farm practice. So Middleton set

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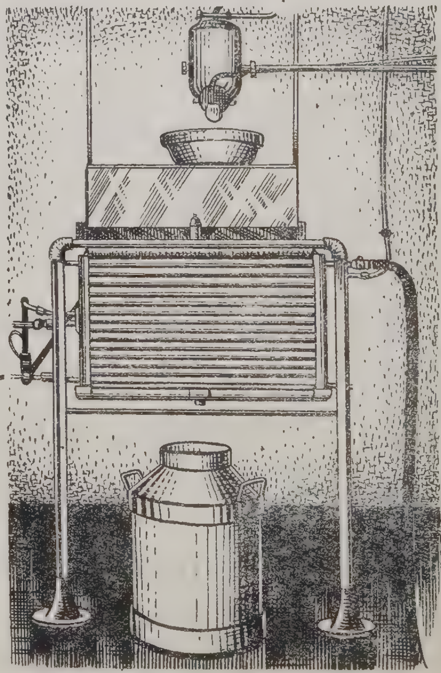

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out 10-acre plots and used cattle as well as sheep as his measuring instruments. "The mixed grazing had the immediate effect of doubling the live-weight increase per acre" (15). Middleton thus discovered the fertility-building effect of topdressing plus heavy stocking. He also found that close grazing was necessary if the clover was not to be overshadowed and weakened.

Gilchrist's contribution was in the selection of leafy and persistent strains of pasture plants. "He used New Zealand strains of ryegrass and cocksfoot as far as possible. . . . He was particularly careful to obtain wild white clover seed from old-established pastures where the strains were persistent" (15).

The fiftieth anniversary of Cockle Park was celebrated last year. A picture of Tree Field, where Somerville worked, is reproduced on page 28.

Grassland Management

In 1904, at the request of the Waikato Farmers' Club (founded in 1889 and a sort of forerunner to the Farmers' Union, later changed to Federated Farmers), and under the auspices of the provincial A. and P. Associations, the Department of Agriculture began its now-famous topdressing trials. The pasture at Ruakura consisted chiefly of sweet vernal, fog, some trefoil, and a little cocksfoot and creeping bent, while at Te Kauwhata it was mainly ratstail. "One of these old pastures, in 1904, was stocked heavily, hay carted on to it and fed off, 2cwt. of basic slag applied, the whole well harrowed, and now other grasses and white clover are appearing" (14). The trial was repeated with other manures, but the final report in 1908 recommended basic slag.

Topdressing, first of hay paddocks, then of grazing paddocks, slowly encouraged other practices of grassland management. "The tripod and chain harrow was used to spread the droppings of the animals. Some farmers went to the extreme of supposing that harrowing was in itself sufficient to maintain and improve their pastures. . . . The work of spreading the droppings was done, perhaps, once in the year . . . in the late winter and early spring. . . . The accumulation of roughage during the summer and autumn was fondly imagined to be the acme of good farming. It denoted that the farm was not too heavily stocked, and carried in the paddocks a substitute for hay. As the feeding of roots was a common winter practice, a run-off of roughage was, in the absence of other provision, a matter of necessity. Pastures that were in a condition for harrowing during the autumn months would have been considered 'hungry' looking. The practice of frequent harrowing, then, was slow to gain ground, as it required a shorter pasture than was deemed practicable or desirable" (11). Frequent harrowing, short pasture, and small paddocks are the basis of "rotational grazing" management.

The Phosphate Economy

Of the fertilisers used bonedust was the prime favourite until it became too scarce and expensive. The liability of foreign shipments to be contaminated with anthrax led to its compulsory sterilisation. It was superseded by George Clark's "Waikato mixture" of equal parts of bonedust, superphosphate, and guano, and this mixture was in turn superseded by basic slag after 1908. With the change from the Bessemer process of steel-making to the open-hearth process, the phosphatic quality of basic slag fell off, and the amount used declined from 36,000 tons in 1914 to 12,000 tons in 1921.

After 1920 superphosphate came to be used in enormous quantities, reaching a maximum of 600,000 tons in 1940, by which time about 4,000,000 acres were being topdressed annually, over 1,000,000 acres receiving lime as well. Nowadays more attention is being paid to minerals other than phosphates, and "straight superphosphate" is being ammoniated, cobaltised, copperised, and "reverted" with calcium and magnesium compounds.

The effect of topdressing was to provide a veneer of fertility which nourished the shallow stoloniferous roots of the white clover plant after the taproot died, and thus made the plant perennial on poor soils. Heavy stocking increased the humus content of the surface film. Heavy stocking was made possible by autumn topdressing, which provided a flush of feed for winter.

The notable feature of Waikato topdressing was that farmers took it seriously and made an annual budget expense of it, as Southland farmers did with liming. So topdressing did not remain merely an interesting experiment as it did in England. It gave the Waikato a tremendous economic advantage over its competitors, Taranaki, Manawatu, and Southland, and eventually forced them to adopt it in spite of their scepticism. From the dairying districts it spread into the fat lamb districts, and for some years now has been pressing hard on the hill-country sheep-farming economy. Phosphatic fertilisers are in world-wide demand, but the Food and Agriculture office of the United Nations estimates that there are sufficient known world reserves to last 1000 years at double the present world rate of use.

Summary

In New Zealand the practice of "topdressing" began in the Waikato, where the amount of stored fertility available for exploitation by pioneer farmers was very small. It was at first a desperate remedy for a desperate situation, and was advanced by a group of men who had not had the opportunity of becoming self-satisfied.

Topdressing was followed by the introduction of permanent strains of grasses and clovers and by a system of grassland management.

The system of "intensive grassland farming" aims at the production of milk by raising the fertility of the soil so that it will grow nutritious pasture plants affording adequate sustenance to prolific cows and ewes, whose milk is used for the manufacture of dairy products and the fattening of pigs and lambs. This aim has prevailed in spite of other aims arising from economic pressure.

Acknowledgments

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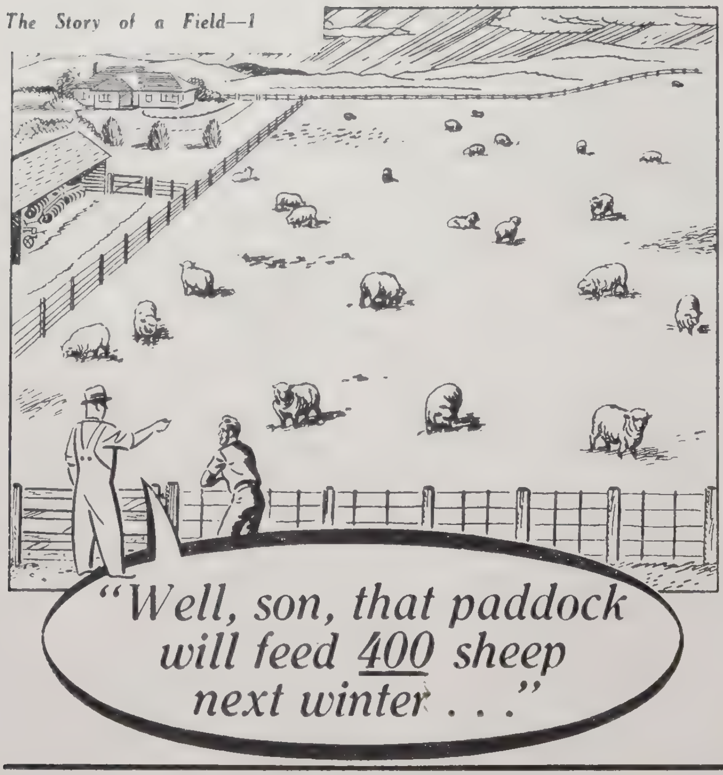
THE AUSTRALIAN SOLDIER FLY

The reported presence in the Opotiki district in recent months of an insect called the Australian soldier fly has attracted considerable attention. The insect has been suspected of causing damage to crops and pastures. About 20 years ago it caused some concern in Australia, but it proved to be of little importance. Nevertheless its presence in this country is being carefully investigated by officers of the Department of Agriculture and the Cawthron Institute.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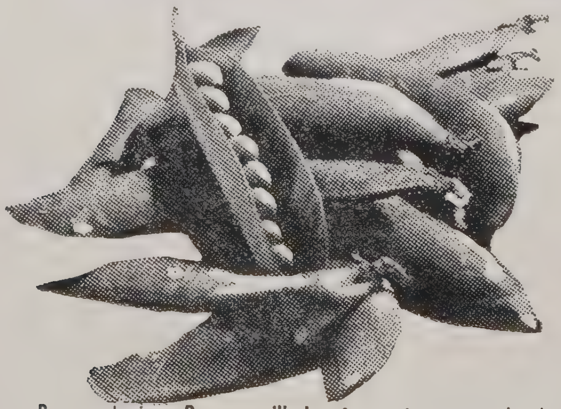

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Casein Whey as Basic Food for Successful Pig Production

By A. LONGWILL, *Assistant Superintendent of the Pig Industry, Wellington.*

THAT casein whey can provide the basis for economic pig production, returning good profits to the producer if management is reasonably good, is well demonstrated by the results obtained by Mr. J. D. Bruce, Horsham Downs, Waikato. His results are duplicated by many other keen pig producers who use cheese whey or casein whey as the basic food for their pigs. Those results prove that satisfactory returns from whey can still be obtained under present conditions if management is satisfactory and includes the provision on the farm of crops for wintering pigs in good condition and the purchase of meat meal to provide a balanced ration for growing pigs and breeding stock at all times.

MR. BRUCE farms 206 acres on the Horsham Downs, some eight miles from Hamilton, and is supplying milk to the Rototuna branch of the New Zealand Co-operative Dairy Company, about a mile and a-half from the farm. The factory is producing casein, and the casein whey, one load of which is collected by Mr. Bruce early each morning, can be used so that the pigs get a warm feed first thing in the day. In that respect Mr. Bruce prefers the casein whey to the cheese whey which he was getting when the factory changed to cheese production during the war.

There is a widespread impression that casein whey is of little value for pig feeding, but its value is practically the same as the whey from cheese manufacture. The results on this farm show what that value is in practice when supplementary feeding is adequate.

The stock carried on the farm throughout the year consist of 115 cows, 30 yearlings, and 30 calves; 200 ewes and their lambs, which are fattened off, being carried on the outlying and rougher portion of the farm; and six draught horses and two hacks, which are used for practically all the work on the farm. Whey is carted from the factory by a motor truck carrying a 400-gallon tank and 10 or more 20-gallon milk cans. Two trips each with 600 gallons are made daily during the flush of the season, the supply dropping to 100 gallons every other day during July.

Normally all the pigs required are bred on the farm, as Mr. Bruce has found that this, coupled with cropping to provide adequate winter feed for breeding stock and store pigs, is necessary for the maintenance of healthy stock. For this purpose a herd of 16 to 18 breeding sows is kept. They are mainly purebred Tamworths of a strain which is good for both production and conformation, but include two Large Black-Tamworth crosses, one Tamworth-Berkshire cross, and one purebred Berkshire. Ten young gilts, from which selection will be made for replacements, are being reared from the Tamworth strain and look very promising. Besides the Tamworth two other boars are kept, one Berkshire and one Large White; both are purebred, but no evidence is available of the commercial qualities of the strains from which they were bred. Mr. Bruce intends to make use of the carcass quality evaluation scheme to get reports on the commercial qualities of the pigs he breeds.

In addition to the breeding stock there were 103 pigs, ranging from weaners to bacon weights, on hand late in March. The baconers were to go off fat during April but, as the practice on the farm is to finish everything as heavy baconers, the youngest pigs are to be carried over the winter as stores on swedes supplemented with meat meal and possibly a little maize, barley, and tallow.

Piggery Layout

The principle of the piggery design is central feeding to minimise the labour of handling such a bulky food as whey. The piggery has therefore been laid out on the "cartwheel" system, which has the disadvantage that the approaches to the central feeding area are likely to get worn out and very muddy in spring. The high standard of Mr. Bruce's management is reflected in the way in which the grass runs have stood up to wear, as is apparent from the illustrations.

They get their heads down and go for it!

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A meal house, with whey tank on top, is in the middle of the central concrete feeding area. The grass runs which radiate out from this hub each have a section of the feeding platform, on which is placed the feeding trough. Moveable houses are situated well back from the centre in each run. Free range on the grass run is provided for sows and litters and all pigs up to porker weights, but two separate fattening houses are provided, each of two units, in which the fattening pigs are finished to top-weight baconers.

The breeding stock occupy a paddock adjacent to the central layout and from it have access to the cow paddocks. They are fed so as to ensure that they do not lose too much condition while suckling and regain good condition quickly after weaning and going back to the boar. The condition of the dry sows is evident from the heading illustration. The litter results show the effect of good management, for the average for a number of years has been seven pigs weaned a litter, or 14 a sow a year.

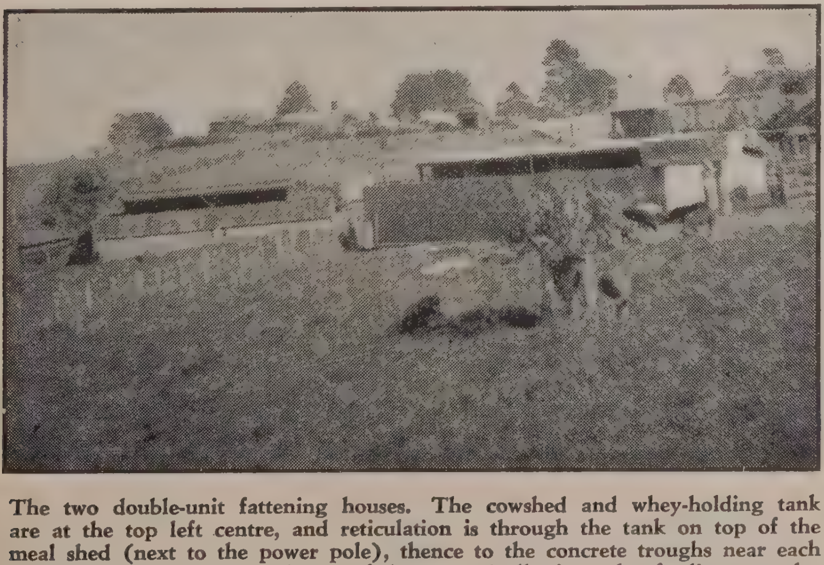
With the exception of the fattening houses, in which the baconers spend the last two months or so of their lives, all houses are of the open-fronted, moveable type on runners so that during the period when no whey can be spared for the store pigs they can be shifted to a cow paddock adjacent to the area cropped for winter feed. That helps greatly in maintaining the grass in the fenced pig runs.

One of the fattening houses. Whey gravitates to the concrete holding trough, and from there to the feeding troughs it is controlled by jets adjusted to feed as much as the pigs will clean up.

Handling of Whey

From the tank on the truck the whey runs into a circular 1200-gallon concrete trough from which it siphons, after being started by pumping, into the central tank in the piggery. A useful practice which has been followed is the addition of lime and a trace of stock iodine at this stage. No system has been clearly defined so far, but it is recommended that 1½lb. of the following mixture to each 100 gallons of whey be stirred up in the tank, repeating the stirring before each feeding to ensure even distribution to the pigs: 1cwt. of ground limestone, 1cwt. of superphosphate or steamed bone flour, ½cwt. of agricultural salt, and 5oz. of potassium iodide (dissolved and sprinkled on during mixing).

A flexible hose from the central tank enables feeding to the troughs round the feeding platform to be easily controlled. Extension pipes provide automatic feeding to the fattening houses and the dry sow paddock, but the supply can be cut off so that the troughs are completely emptied once each day and the troughs and storage vessels can be cleaned. Concentrates are measured out into buckets in the meal shed and spread on the whey in the trough at the morning and afternoon feeds. The allowance is a little less than ½lb. of meal a pig daily to weaners and stores and a little more than ½lb. to fattening pigs. Only meat meal is being used, as it is considered the most economical supplement to whey at present prices.



The two double-unit fattening houses. The cowshed and whey-holding tank are at the top left centre, and reticulation is through the tank on top of the meal shed (next to the power pole), thence to the concrete troughs near each house. From there the whey is fed automatically into the feeding troughs.

Rearing of Litters

Litters are given access to dry meal in a covered, box-type self feeder placed in the farrowing pens. The little pigs soon find the meal, after which they visit the sow's trough for a drink.

The most difficult part of the rearing period is that immediately after weaning. It has been found unwise to allow pigs at that stage all the whey they will eat, as that places too much strain on the digestive system. Upsets follow and losses from pneumonia have been traced to overfeeding with whey. Half a pound of meat meal a pig and 2½ gallons of whey spread over five feeds a day is sufficient for a start.

If they are given a free run on good-quality grass and measures are taken to ensure that they are always ready for a feed at feeding time, the pigs go ahead rapidly and are soon able to take full feeding. A little cod-liver oil or fat, when available, is a big help in overcoming the sudden change in diet at weaning from the rich sow's milk to a fat-deficient ration.

The pigs continue to run out on the grass runs until, at about 120 to 140lb. live weight, they are drafted into the fattening house, each lot going over the

CASEIN WHEY AS PIG FOOD

Some of the breeding sows with the Large White boar.

scales to ensure that the most profitable weights are achieved. Pigs are all sold on hooks so that full information on the grading is obtained.

Crops are grown regularly for wintering. This season maize and swedes were sown, but the maize was caught by a late frost and was a complete failure. However, the 3½ acres of swedes are a good crop and, supplemented with meat meal and such other concentrates as can be bought, should carry the 100 or so stores and breeding stock through the winter satisfactorily.

The stores are all ringed before being put out into the cow paddocks, where they are run with a daily ration of dry meal and a little whey with free access to water until it is necessary to start the feeding of the swedes. The cropped area is on dry peat, and the pigs will be given access to the crop with run on to the grass paddocks where their houses and troughs are placed.

The sows start to farrow in June and they, with their litters, will be the only pigs kept in the main piggery until the whey supply in early spring increases to the stage at which there is a surplus over their requirements. Then the most forward stores are drafted into one of the fattening houses, the others following as the swedes are cleaned up and the whey supply permits.

Pig meat production over 12 months, after allowing for differences of stock on hand, totalled 24,000lb. In addition, breeding stock equivalent to the production of 4000lb. of pig meat was sold. Whey used during the same period was 250,000 gallons. After deducting £260, the cost of all bought foods, including £55 for other suppliers' whey, from the net proceeds from the pig meat, and allowing £50 for cartage of whey, the farm return was 0.7d. a gallon of whey. That is considered by Mr. Bruce quite a fair return for the effort involved in the provision of home-grown crops and handling of the whey, as well as showing a reasonable return on capital invested.

This example of good pig management shows the value of whey to the farmer who is prepared to use it efficiently. It is estimated that enough whey is going to waste in New Zealand to produce an extra 200,000 baconer pigs. Such waste is most unfortunate in view of the present world shortage of meat and fats. An effort to eliminate it is not merely a moral duty but will show a profit to the farmer and help to safeguard New Zealand's overseas market for pig meats.

PEDIGREE SOW RECORDS

DURING the three months January-March, 1947, seven of the eight litters recorded were sufficiently good to be included in one of the five grades set out below.

Grade	Minimum Litter Weight	
	At 3 weeks.	At 8 weeks.
1	120 lb.	360 lb.
2	100 ,,	300 ,,
3	90 ,,	270 ,,
4	80 ,,	240 ,,
5	70 ,,	210 ,,

Contributed by the Livestock Division.

Breed Averages for the Period

Breed.	No. of Litters Recorded	Litter Weight at		Number of Pigs.		Average Weight at	
		3 weeks (lb.)	8 weeks. (lb.)	Born.	Weaned.	3 weeks. (lb.)	8 weeks. (lb.)
Berkshire ..	4	101.3	327.0	9.8	8.5	11.91	38.47
Tamworth ..	3	85.7	268.0	8.3	7.0	12.24	38.29

A No. 3 grade litter is looked on as a good performance, No. 2 as excellent, and No. 1 as special.

The following list gives the names and addresses of the breeders of recorded sows and details of the litters:

Owner's Name and Address.	Herd Book No. of—		Litter Weight at		No. of Pigs.		Grade of Litter
	Sire.	Sow.	3 weeks (lb.)	8 weeks. (lb.)	Born	Weaned	
Berkshire							
Pohangina Pig Club (secretary, Spelman, T. J., R.D., Ashhurst)	21226	19540	99	360	11	8	3
Jones, J. H., Selwyn Street, Leeston	21411	21857	70	280	9	9	5
Rotomanu Pig Club (secretary, Hodgkinson, H. E., Rotomanu, Westland)	18295	19461	113	308	8	8	2
Hodgkinson, H. E., Rotomanu, Westland	18295	20718	123	360	11	9	1
Tamworth							
Hari Hari Pig Club (custodian, Manship, G., Hari Hari)	13754	13728	85	278	10	8	4
Hari Hari Pig Club (custodian, Manship, G., Hari Hari)	13754	11634	46	147	5	4	—
Ogle, F., & Son, Normanby	15304	14943	126	379	10	9	1
Large White							
Haydon, G. C., Barrytown, Pte. Bag, Greymouth ..	6129	6484	139	457	13	10	1

Winter is the Time to Repair Gates and Fences

By C. P. WHATMAN,
Instructor in Agriculture, Timaru.

WINTER provides the opportunity to catch up with those repair jobs which had to be postponed in the rush of summer and autumn work. Not the least important is the repair or renewal of gates and fences. Few tasks are more important, both from the practical point of view and for the pride and satisfaction which a farmer gets from a tidy farm.

REPAIR problems are difficult at present because of the high cost of materials and frequently the impossibility of getting them at any price. Hence it is doubly important that the best use be made of what is available and that repairs which will increase the life of existing fences should not be delayed.

Gates

Properly-swung gates will save time, temper, and material out of all proportion to their original cost.

Wider gates are needed now than in the days when the widest implement using them was the drill. The 6ft. header harvester requires 12ft. gates, but larger machines need 14 or 16ft. That is wide for a single gate, and the use of two 7 or 8ft. swung hurdles will often be found advisable. There is then less strain on the gate, and, though two pairs of hinges are required, they can be very light, and therefore cheap in comparison with those needed for a wide gate.

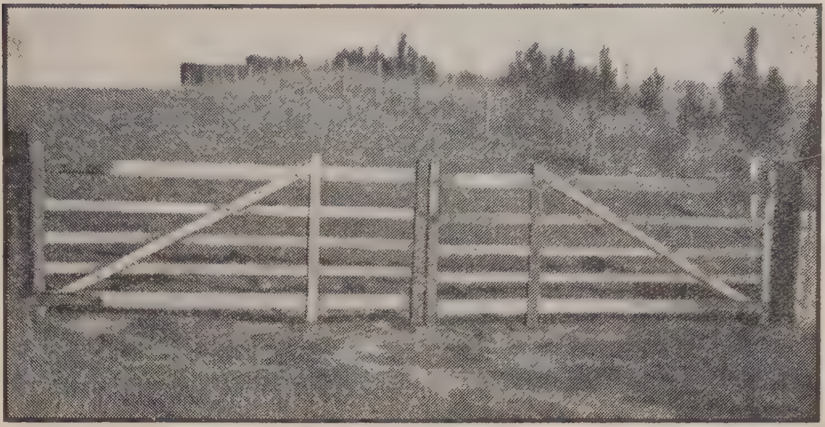
A dog with a threaded shank to go right through the post is required at the top, and a driven spike is sufficient at the bottom. A light chain and hook, bolted to one gate and dropping into a staple on the other, can be used as a fastening for the double hurdle.

Construction of these hurdles is extremely simple; 3in. x 1in. timber is used, and the only tools necessary are saw, brace and bit, and hammer. The hurdles should be bolted together, making a much more lasting gate than one that is nailed.

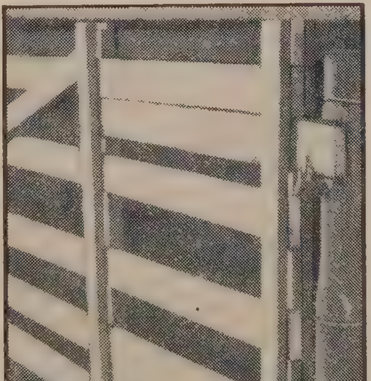
Gateposts should be cut off level with the top of the gate, and capping them with a piece of sheet iron will prevent rotting and prolong their life.

Fastenings

Gate fastenings allow the ingenuity of the farmer to be displayed, but they should be as simple as possible. The gate shown on the right is excellent in that respect. Two rails extend from the head of the gate and lift on to two old mower fingers driven into the gate post. This fastening has the added advantage of supporting the head of a 12 to 14ft. gate, obviating the necessity for the head to rest on a block placed beside the gatepost. With a lightly-constructed gate some such support is essential or the gate will soon sag and start to drag on the ground; when that happens it will quickly go to pieces because of the strain to which it is subjected when being opened and closed. The double type of fastening, acting at both top and bottom, also prevents warping, which is particularly likely if unseasoned timber has to be used in the construction.



For wide gateways the use of a pair of 7 or 8ft. hurdles allows gates and hinges to be lighter.



A good type of fastening for a long gate. The two rails, which rest on old mower fingers, help to support the gate.

Gates and droppers may be given a longer life by treating them with paint or creosote; failing those, waste oil will do some good.

Fences

Before a fence is tightened all gateposts and corner posts must be solidly supported by stays well footed and notched into the posts. The efficiency of both fences and gates depends to a large extent on the stays used. They should be 10ft. long and should reach the post about halfway between the top and bottom wires. A stay which is too low puts too much strain on the top of the post; if it is too high there will be a tendency for the post to be lifted when the wires are tightened.

Next, standards and droppers should be straightened and broken ones renewed. Droppers should be at least 2in. by 1½in. and may be bored at the correct spacing and wired to the fence. Extra droppers can be put on if the wire is old; then it need not be strained so tightly.

If any new wire is available, it should be used to replace the wire second from the bottom, as that is where sheep are likely to cause the greatest strain. New wire should be strained again some months after it has been put on.

Buildings

Though shortages of materials make the time inopportune for an extensive programme of constructing new farm buildings, frequently a good deal can be done by renovating existing buildings. In many cases the renewal of a few rotted posts in an implement shed will prevent further deterioration. At the same time such renovations can be made part of a fuller plan to be proceeded with when materials are again available.

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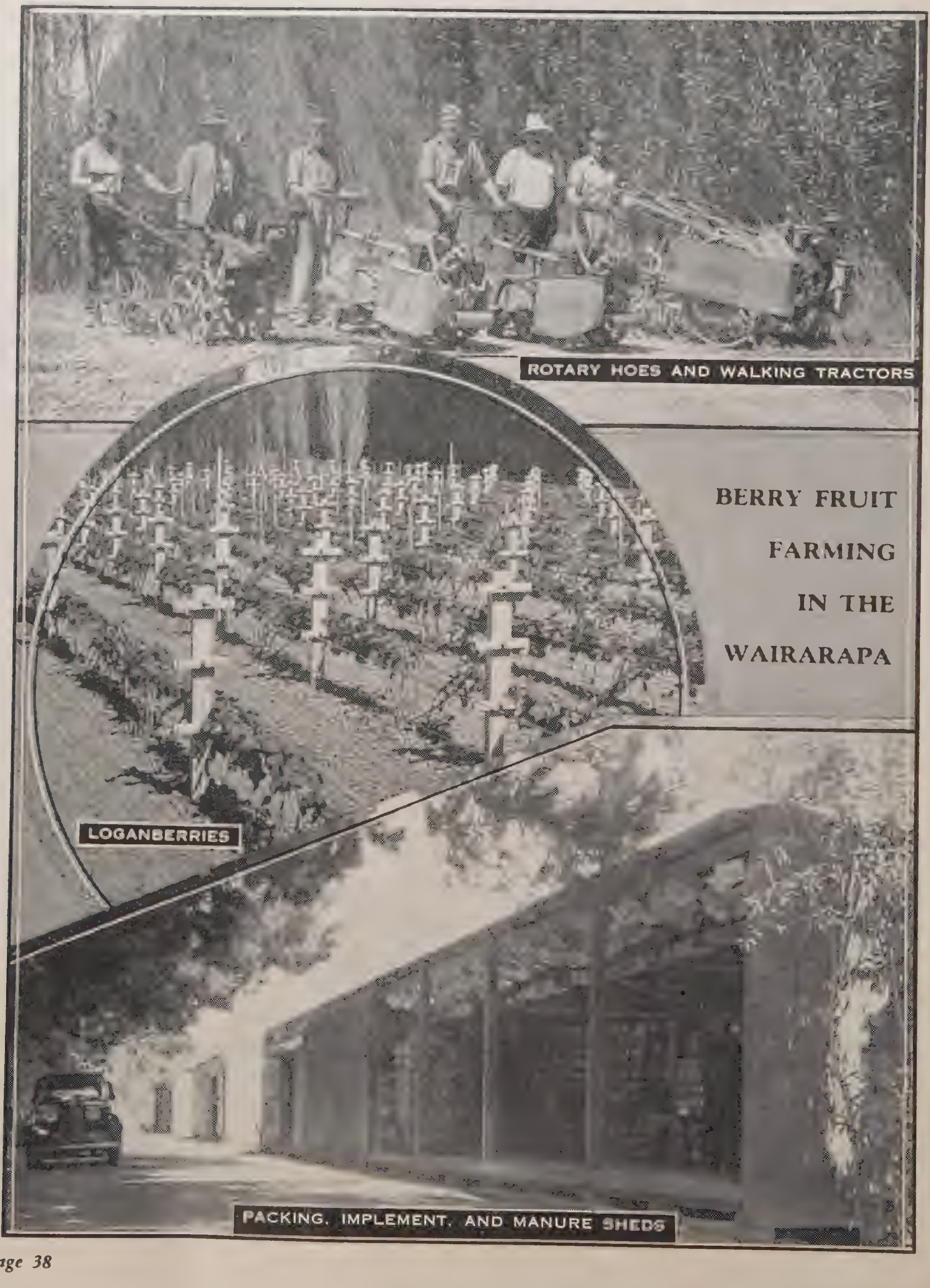
BERRY FRUIT FARMING IN THE WAIRARAPA



ROTARY HOES AND WALKING TRACTORS

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BERRY FRUIT CULTURE IN WAIRARAPA

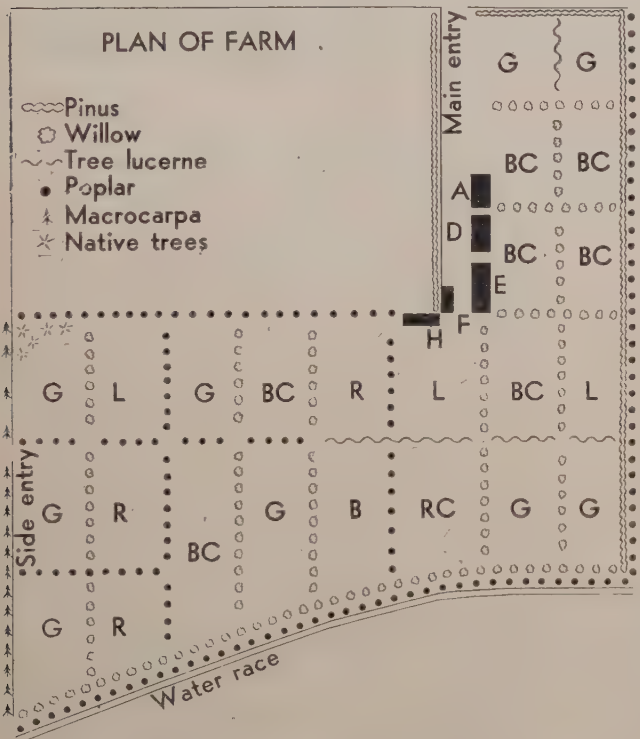
Small Fruits Production a Profitable Business

By J. O. ANDERSON, *Orchard Instructor, Greytown.*

THE demand for small fruits is showing a steady increase throughout the Dominion, and at present far exceeds the supply. That the growing of mixed berry fruits may become a successful and profitable business is demonstrated on the small holding of 16 acres in the Wairarapa described in this article.

IN the Greytown district of the Wairarapa, which for many years has been well known for its raspberries, currants, and gooseberries, the soil type admirably suits the cultivation of small fruits, and further plantings are being made. The deep rich loam, of which there are considerable areas, grows currants and raspberries equal to any in New Zealand, while the lighter types of soil suit gooseberry culture.

The climate of this district also plays a very important part in the production of small fruits, the heavy winter frosts and cold conditions giving the plants a complete rest for at least 3 months, followed by regular spring and early summer rains so essential to good growth and fruit development. Good shelter is essential to protect the small fruits from strong winds, particularly from the south-westerlies to which the Wairarapa is so subject.



A—Implement shed. D—Manure shed and workshop. E—Packing shed. F—Toolshed. H—Tearoom. G—Gooseberries. BC—Black currants. L—Loganberries. R—Raspberries. B—Boysenberries. RC—Red currants.

Black currants are planted 1210 bushes to an acre and in a favourable season yield well over 2 tons of fruit an acre. Properly-managed bushes will produce heavy crops for 12 years or longer.

That small fruit growing can be a successful and profitable business has been demonstrated on the property of Mr. S. H. Nichols, of Greytown, who has under cultivation about 16 acres of mixed berry fruit.

The area was taken over 18 years ago as a bare section on which a boundary fence was the only improvement. The garden is a mile and a quarter from the Greytown Post Office, on a fertile sandy loam soil, with a rather shingly subsoil which ensures the reliable and rapid drainage of the soil so important in small fruit culture.

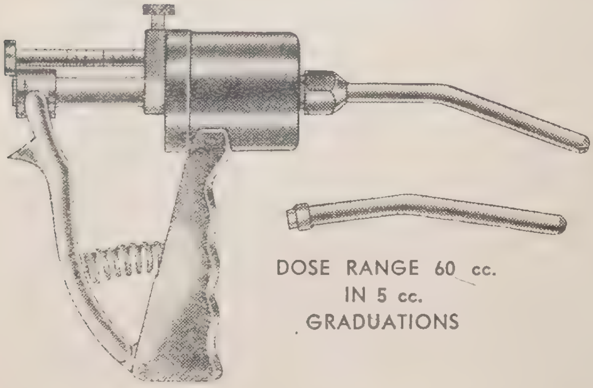
Layout and Shelter

Before any small fruits were planted Mr. Nichols made a careful study of the layout of his property and planted shelter where it would be most beneficial. One row of Lombardy poplars was planted 2ft. apart on the western boundary and a row of *Pinus radiata* (*insignis*) was planted 6ft. in from the poplars. Later the pines were topped at 15ft., and the inside kept trimmed from ground level to make a solid shelter which gives good protection from prevailing winds. The southern boundary is planted with *Pinus radiata* and Lombardy poplar, and the northern boundary is double planted with Lombardy poplar and goat "pussy" willow (*Salix caprea*).

The whole area was then subdivided into blocks of about an acre and shelter planted so that each block is protected on its four sides. For subdivision shelters goat willow, tree lucerne (*Cytisus proliferus*), and Lombardy poplar were used.

Small Fruit Plantings

At present Mr. Nichols has 7 acres of gooseberries, 4 acres of black currants, ½ acre of red currants, 1½ acres of raspberries, 1½ acres of loganberries, ½ acre of boysenberries, and ½ acre reserved for a nursery in which he raises plants for replacements.



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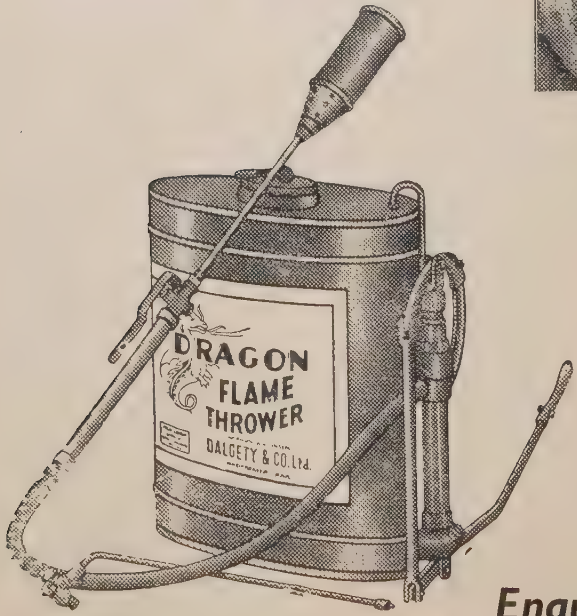

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Gooseberries: The variety of gooseberry favoured by Mr. Nichols is Farmer's Glory, a heavy cropper with a large berry, and by far the most popular variety in the Wairarapa. The crop averages 6 tons to the acre from mature bushes which are planted 7ft. x 7ft. apart (890 to the acre). The average life of a gooseberry plantation under good cultural conditions is considered to be 12 years.

Black Currants: Lee's Prolific and American Champion are the main varieties of black currants grown; they are planted 6ft. x 6ft. apart (1210 bushes to an acre). Under favourable seasonal conditions well over 2 tons of fruit are produced per acre. Like the gooseberry, properly-managed currants will produce heavy crops for 12 years or longer in suitable soils.

Raspberries: Lloyd George and Fillbasket are the varieties of raspberries grown by Mr. Nichols. Lloyd George ripens early (about mid-December) and is in good demand for the Christmas trade, while Fillbasket begins to ripen at the end of December or early in January: Harvesting lasts from six to eight weeks, and one and a-half to two and a-quarter tons of fruit per acre is usually produced.

Loganberries: One and a-half acres of loganberries are grown. The canes are supported on double wires which are fastened to well-made reinforced concrete posts, grooved on the top to carry the irrigation pipes. Irrigation, when necessary, is done by the Pope system in which the nozzles or nipples placed 18ft. apart on the pipes throw a cone of spray 18ft. in diameter. Plants are spaced 12ft. apart in rows 6ft. apart. The average crop ranges from 3 to 4 tons an acre.

Boysenberries: Half an acre of boysenberries are grown, trained and irrigated on the same system as the loganberries. Plants are 12ft. apart in rows 6ft. apart. The large, dark-red berry, very luscious when ripe, is in great demand. Up to 4 tons per acre are produced.

Cultivation

Mr. Nichols believes in thorough cultivation, and has ample motor implements to carry out this work, including two rotary hoes, which are in constant use during spring and early summer for shallow cultivation between the rows, and two 6 h.p. tractors for ploughing and tine cultivation. Cultivation around the bushes is done by hand, great care being taken to avoid damaging the shallow feeding roots.

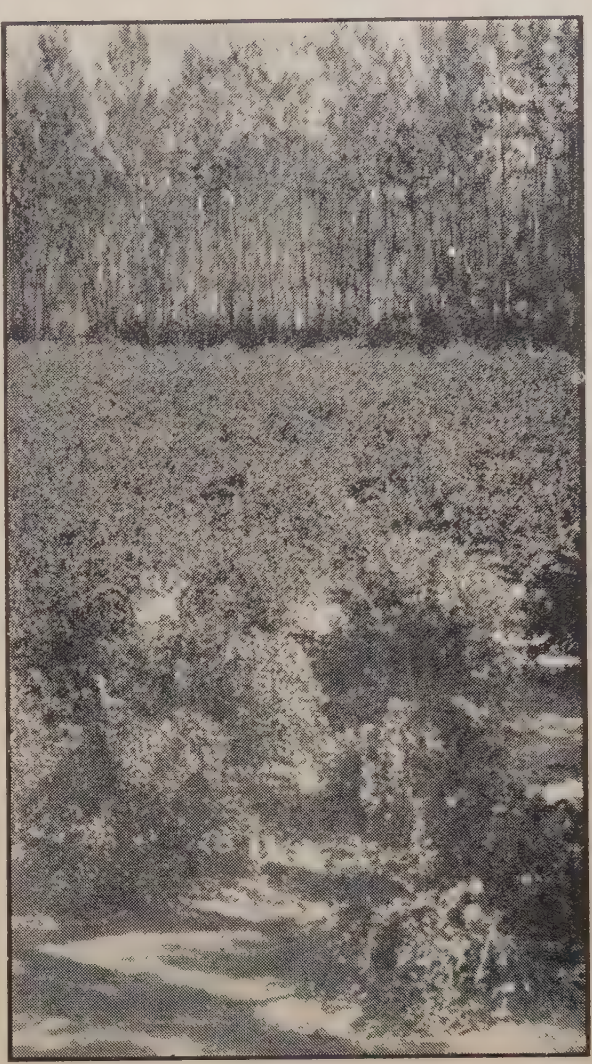
Spraying

For regular control of diseases and pests, a Bean pump with a 60-gallon barrel mounted on a carriage is drawn along the headlands by tractor. Long hoses which will reach half the length of the rows of plants are used; when half of the block has been sprayed the pump is moved to the other end of the rows to spray the second half. The spray outfit is too large to go up and down the rows, and considerable time could be saved by one which could be drawn between the rows.

Labour

Five young men are employed regularly on the garden. Immediately after harvesting is completed all shelter belts are trimmed up. Fruiting canes of raspberries, loganberries, and boysenberries are removed and burnt and new canes of loganberries and boysenberries tied up to the wires to clear the ground ready for cultivation. As soon as leaves have fallen from currant and gooseberry plants pruning is begun, for which several extra hands (women) are employed.

Three large sheds, two 20ft. by 40ft. and one 30ft. by 60ft., enable all implements and equipment on the farm to be kept under cover. The larger shed has a workshop at one end, and the rest of the space is used for storing fruit containers and for packing the fruit. Adequate shed accommodation contributes considerably to efficiency in management. Mr. Nichols's home is not on the farm property, but is handy enough not to prejudice efficient control of farm operations.



Farmer's Glory, averaging 6 tons of large berries to the acre, is the variety of gooseberry grown. Bushes are spaced 890 to the acre and bear well for 12 years.

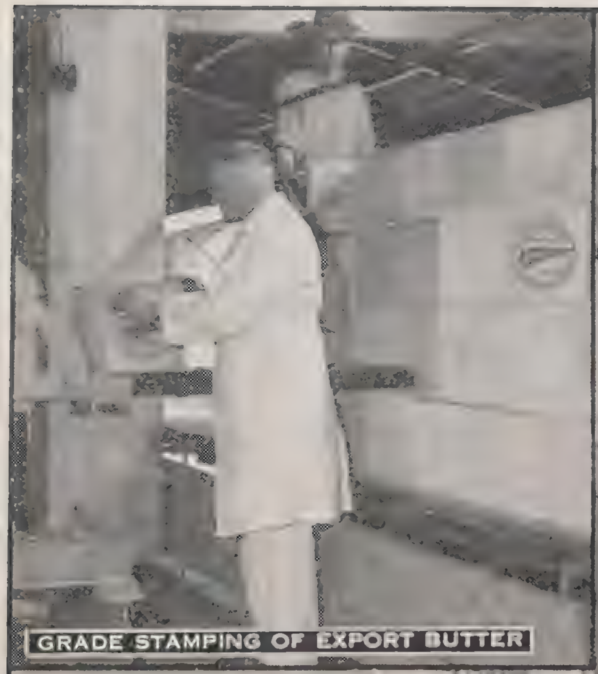
Harvesting

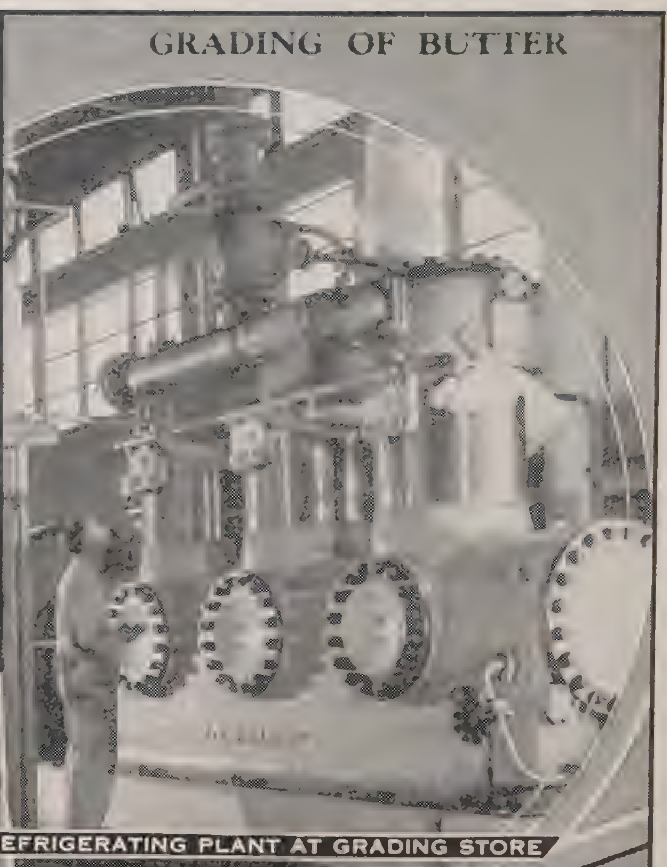
Harvesting, which begins with the gooseberries about the middle of November, is continuous until the last of the currants and raspberries are picked about the end of February or early March. Twenty-five to 30 pickers are engaged. Because of the shortage of local casual workers, some of the pickers are transported from centres as distant as Masterton, 15 miles to the north, and Martinborough and Featherston in the south.

The whole of Mr. Nichols's land is planted in small fruits. The place is well kept and appears to run with smoothness and precision, which speak highly of the owner's skill and organising ability.

All photographs by Hope, Cross, and Richardson.

GRADING OF BUTTER


GRADE STAMPING OF EXPORT BUTTER


PART OF REFRIGERATING PLANT AT GRADING STORE

Boxes or cartons from every churning of butter are check weighed and graded by experts. A sample of every churning is analysed for moisture, salt, and butterfat content, and periodic laboratory tests are made. The Auckland cool stores illustrated are co-operatively owned and operated and are typical of those in which the produce of New Zealand's 157 butter factories or creameries awaits shipment at main ports.

CHEMICAL ANALYSIS OF BUTTER

GRADING EXPORT BUTTER

The Grading of Dairy Produce

By M. R. TENNET, *Dairy Produce Grader, Wellington.*

THE necessity for grading dairy produce before export to safeguard the reputation of the national product in overseas markets was recognised toward the end of last century in New Zealand, which was the first country in the world to inaugurate a system of compulsory dairy produce grading. It was begun in 1894, when the Dairy Industry Act provided for the compulsory grading of all New Zealand butter and cheese intended for export. The grading and grade-stamping of butter in accordance with the Act was begun immediately, but though an official inspection of cheese was made, and the manufacturer was supplied with a copy of the grader's report, grade-stamping did not come into operation until six years later.

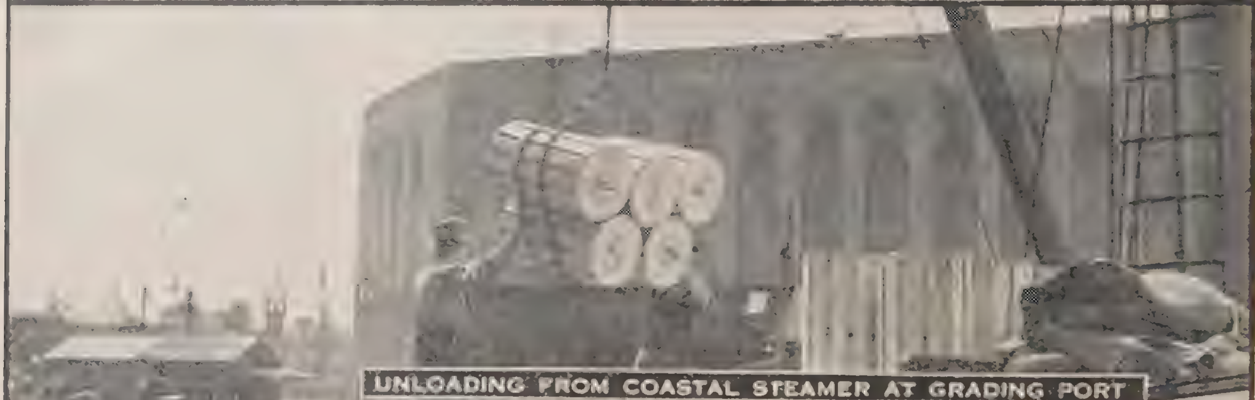
WHEN first suggested the grading proposal had few advocates, and was subject to much opposition. However, the then Secretary of Agriculture, Mr. J. D. Ritchie, foresaw the benefits to be gained from the systematic classification of dairy produce, and despite much criticism the work was eventually undertaken with the strong support of the Hon. J. McKenzie, then Minister of Agriculture. It was primarily for educational purposes and to keep dairy factory managers informed of the quality of their produce.

After the inception of grading a gradual improvement in the general quality of butter and cheese became noticeable and those engaged in manufacture began to recognise its advantages. Within a few years a marked improvement was apparent, and many who had been opposed to the system became its most ardent supporters.

The system soon obtained the confidence of the overseas trade, who quickly recognised it as a protection to both buyers and sellers, and for many years the graders' certificates, commonly known as grade notes, have been accepted as the basis of the purchase and sale of New Zealand dairy produce. Competitors also recognised the value of grading and quickly followed suit. Queensland was the first to follow in 1904, then other Australian States, Canada in 1923, South Africa in 1930, and finally the Irish Free State. On the Continent of Europe Denmark began grading in 1906, followed by Sweden, Finland, and other Baltic States; before the Second World War the U.S.S.R. had introduced a grading system.

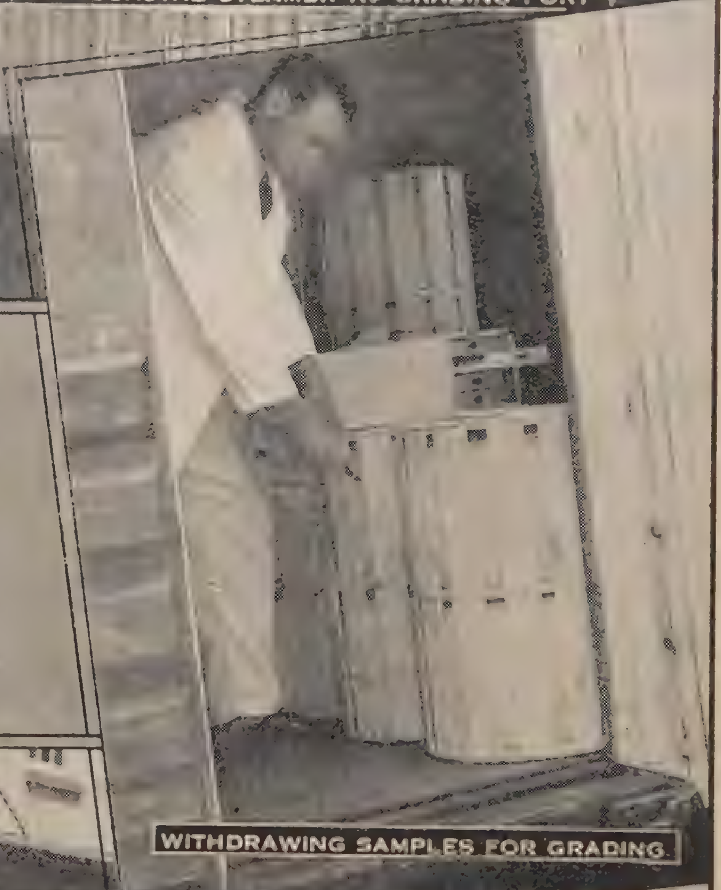
Since the New Zealand Government introduced its policy of marketing butter and cheese, and since the inauguration of the Primary Products Marketing Department, all butter and cheese for export has been paid for on the grading and classification as determined by the dairy produce grader. During the year ended July 31, 1946, 101,373 tons of creamery butter, 2604 tons of whey

CHEESE ARRIVING AT GRADING STORE

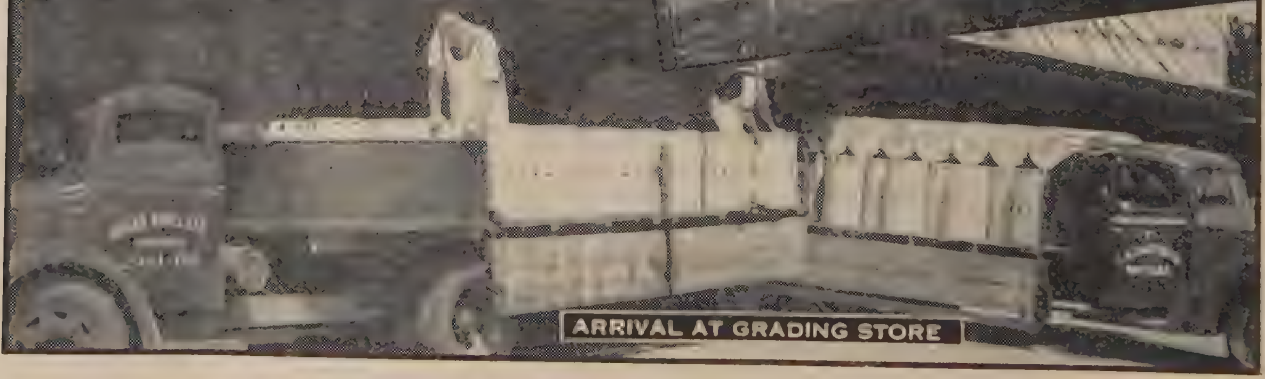


UNLOADING FROM COASTAL STEAMER AT GRADING PORT

Cheese is forwarded from factories by road, rail, and coastal steamers to cool stores at the main grading ports. Government grading officers uncrate at least 4 per cent. of the cheeses for check weighing, and at least one sample from every vat is taken for quality grading by sight, feel, taste, and smell, and for laboratory analysis. Factory brands, vat numbers, and date of manufacture are recorded on all export cheeses and on the ends of crates.



WITHDRAWING SAMPLES FOR GRADING.



ARRIVAL AT GRADING STORE

butter, and 88,185 tons of cheese, with an approximate value of £23,475,465, were paid for on the graders' classification.

Grader's Responsibility

Such a responsibility demands that the grader be a reliable judge of butter and cheese. He must have wide experience and sound qualifications, as he must be able to detect faults in the product with accuracy and, through the grade notes, indicate defects to the manufacturers. He maintains the standard of quality demanded by the trade in Great Britain, New Zealand's principal market. The trade has such confidence in the New Zealand grading system that produce largely changes hands solely on the basis of the official note.

Administered by the Director of the Dairy Division of the Department of Agriculture, grading is carried out at 14 grading stores throughout the Dominion. Practically all these are co-operatively owned by farmers and they are very efficiently managed. Much depends on careful handling, storage, and control of temperatures of such perishable products.

To assist the industry, when grading was first introduced the Government paid all charges for grading and storage. In 1900 it was decided that the producers should bear part of the expense, and the Government contributed an annually-decreasing proportion of the cool storage charges until such assistance ceased after the 1907-08 season. However, the cost of the grading was still borne by the Government, and it was not until 1921 that a grading fee was introduced. The rate was fixed at 1d. a box of butter and 1.33d. a crate of cheese, though these amounts were increased for a period, they are now back to the original figures.

Grading Points

Grading is by the scoring system, and points are allotted as follows:—

Cheese

Flavour	45
Body	20
Closeness	20
Colour	10
Finish	5
Possible	100

Creamery and Whey Butter

Flavour	50
Body and texture	25
Colour (including salt if any)	20
Finish	5
Possible	100

For cheese there are four classes—finest (93 points and over), first grade (91 and under 93), graded (88 and under 91), and second grade (under 88); creamery butter is graded into three classes—finest (93 and over), first grade (90 and under 93), and second grade (under 90); and whey butter into first grade (88 and over) and second grade (80 and under 88).

As an incentive to manufacturers to improve quality, differential prices are paid. For instance, those fixed by the Government for the 1946-47 season were:—

	Pence per lb.
Creamery Butter	
Finest grade:	
94 points and over	15.515
93 to 93½	15.39
First grade:	
92 to 92½	15.3275
90 to 91½	15.14
Second grade:	14.64
Whey Butter	
First grade:	13.89
Second grade:	13.39
Cheese	
Finest grade:	
94 points and over	8.88625
93 to 93½	8.855
First grade:	
92 to 92½	8.73
90 to 91½	8.6675
Under first grade	8.48

In addition to those prices, farm and factory cost allowances are paid.

Consignments of butter and cheese may be sent to the cool stores for grading by rail, road, or sea, and one of the duties of the grader is to inspect the condition of each consignment on arrival. Defects such as soiled or broken packages are then detected, and any package considered not suitable for export is rejected. The graders have the co-operation of the cool store staffs, who when discharging produce may detect some defect, such as mouse-eaten cheese, which would not have been noticed otherwise.

Dairy companies are required to send to the grader and the cool stores authorities with each consignment an advice note giving particulars of the total number of packages, the number of crates of cheese in each vat, and the number of boxes of butter in each churning.

Grading of Butter

At all grading stores a special room is set aside for the grading of butter. One box from each churning is selected indiscriminately, the lids are removed, and a number not less than 4 per cent. of the total boxes in the consignment is prepared for check weighing of the butter. The grader enters in the grade notebook all particulars of the consignment—brand, registered number of the factory, churning dates, and such details as whether the butter is salted or unsalted and the type of container used.

Then the grader examines the butter with a butter trier. He gently passes the trier through the butter at a slight angle, being careful not to extend it right through or air would be admitted. The trier, or iron as it is frequently called, is turned carefully to cut the butter and then withdrawn from the box, bringing with it a sample consisting of a core about 9in. long. It is immediately passed under the nostrils to determine the aroma, after which a small portion is used to determine the flavour by tasting. Complete silence is necessary, as the slightest noise distracts the grader from concentrating on searching the butter for undesirable flavours.

The body of the butter is carefully examined. An ideal butter has a firm, solid body which will stand up under favourable temperature control, and a waxy, closely-knit texture not leaky, mealy, or greasy in character. A good body is looked on as a guardian of flavour, and the body of New Zealand butter is viewed with envy by other exporting countries.

The butter is also examined for colour, as unevenness or streakiness detracts from its value. Strict attention is paid to the finish, and defects in wrapping or packing are penalised. After the complete examination of every churning in the consignment the grader enters in his grade book the total score of the consignment and any remarks about defects.

The consignment is then check weighed and any churnings under weight are rejected. The boxes examined by the grader are marked with a "sampled" brand by the cool store staff, who then nail on the lids. The storeman is notified in writing by the grader of the classification of the consignment, which is then stamped according to the grade and, with the boxes examined, immediately placed in the freezing chamber to reduce the temperature to 15 degrees F. or lower, at which temperature the butter is eventually shipped.

Grading of Cheese

Cheese is graded by a different method from butter, mainly because laying out cheese crates in the same manner as butter boxes would involve too much labour and space. Each consignment is followed up from the time it is received and samples are obtained before or after it has been placed in the cool chamber.

A sample or plug of cheese is taken from each vat in the consignment with a cheese trier. The outside end of the plug is carefully replaced in the cheese and the surface smeared with

GRADING OF CHEESE

All export cheese is subjected to the grading test and the grading certificate issued to the dairy company and the Marketing Department is now recognised as the certificate of payment for the produce. Payment is made according to the quality assessment made by the dairy produce grader. Until cheese is shipped it is held in cool chambers at precisely-controlled temperatures and humidity.

ANALYSIS OF CHEESE AT GRADING PORT

EXPORT CHEESE IN COOL CHAMBER

GOVERNMENT OFFICERS GRADING CHEESE SAMPLES a mixture of wax and paraffin to exclude air and prevent mould penetration. The samples from all vats in the consignment are then graded. The flavour of the cheese is ascertained chiefly by smell, though tasting is sometimes resorted to. A portion of each sample is rubbed up with the thumb and forefinger to warm it and bring out the characteristic flavour of each cheese.

As New Zealand has acquired a reputation for a mild-flavoured cheese, exception is taken to strong objectionable flavours. Some defects in both butter and cheese are caused by tainted cream or milk. The quality of dairy produce depends to a great extent on the quality of the cream or milk from which it is made.

The body of the cheese is judged by the manner in which it breaks down—a judgment which must be based on expert knowledge and skill. The body of a good cheese should be smooth and meaty, with no tendency toward weakness or over-firmness. Closeness in texture is very desirable in a cheddar cheese, and the colour should be uniformly straight and not bleached. Strict attention is paid to the finish of the cheese and the crates in which it is packed; careless branding and packing and blemishes on the rinds are penalised. It is most important that the cheese has a sound rind free from cracks, or mould will enter and cause considerable loss to the purchaser, as well as resulting in a claim for compensation.

After the grader has dealt with the consignment he enters in his grade book the total score of the consignment. Four per cent. of the consignment is check weighed and all crates are branded by the cool stores staff with the grade stamp.

To maintain grading on a uniform basis throughout the Dominion regular visits are paid to each grading store by a Superintendent of Grading.

Chemical Analysis

As well as being graded, all butter and cheese is subject to chemical analysis. This important feature of the work is undertaken by dairy produce testers under the direct supervision of the dairy produce graders. Butter is analysed for moisture, salt, fat, curd, and ash content, and cheese for moisture and fat. In addition, full advantage is taken of the facilities at the Dairy Laboratory of the Dairy Division at Wallaceville, to which samples of produce are sent regularly from all grading stores for bacteriological examination. The results of these analyses are passed on to dairy companies and have proved of great assistance in overcoming defects in quality.

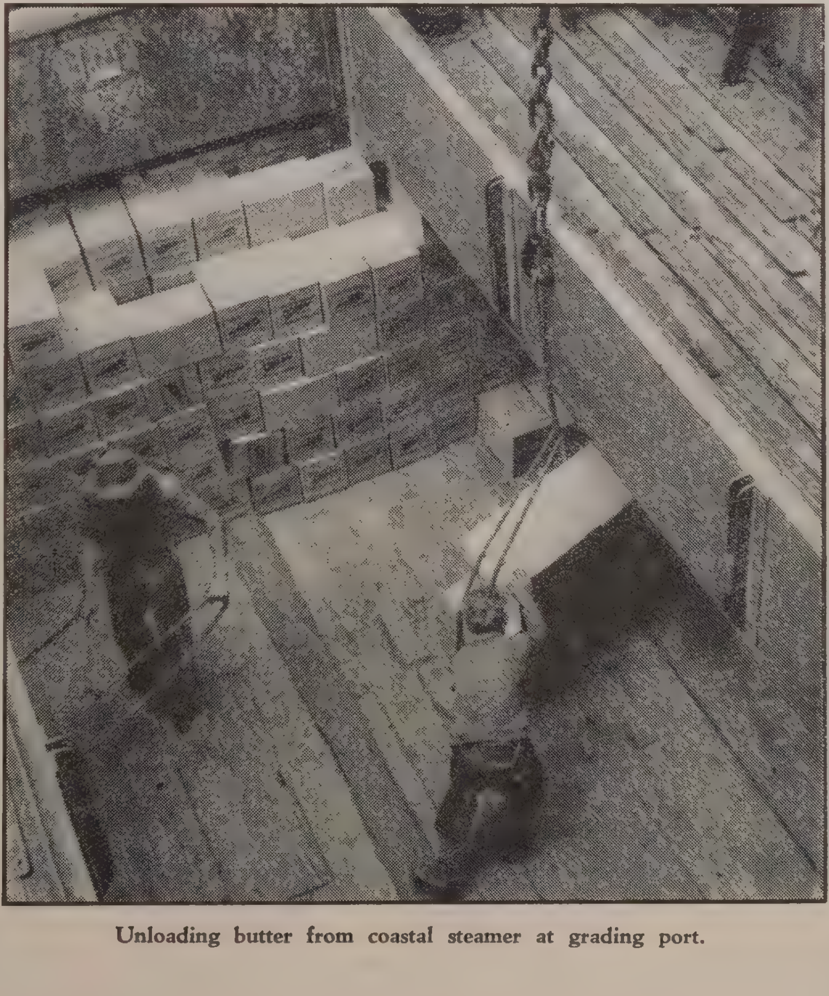
After completion of the grading and analysis, copies of the grade notes giving all particulars of the consignment are sent to the Marketing Department and managers and secretaries of dairy companies.

Thus, as originally intended, the grading system continues to be of educational value. Manufacturers are advised of defects in their produce which enables them to inquire into their methods of manufacture. Government Dairy Instructors are advised of the grades of factories in their areas, and in the event of a serious decline in quality in any brand the instructor can visit the factory and assist the manager to locate the cause and remedy the defect. Dairy factory managers are encouraged to visit the grading stores, where, in company with the grader, they can examine not only their own produce but that from other factories.

Inspection in Britain

The inspection of dairy produce was begun in Great Britain in 1912. Officers of the Dairy Division with headquarters in London inspect and report on the condition of the produce on discharge at ports in Great Britain and are in close contact with the trade, both wholesale and retail. Periodically they visit the Continent to report on developments in marketing or manufacture. Thus New Zealand is kept well informed, and that alone has proved of immense value to the industry.

Dairy produce grading has proved of immeasurable value to the industry, and full credit must be given to the foresight of those who pioneered it. Since its inception there has been a constant effort toward improvement and uniformity in quality, and as a result New Zealand has risen to an eminent position in the dairy-exporting world. To a large extent that has been achieved by the co-operation of all concerned, the ability and keenness of managers and staffs of dairy factories, and in no small measure by the efficiency of the dairy produce grading system.



Unloading butter from coastal steamer at grading port.

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Maintenance Work in the Home Orchard

By R. G. HAMILTON, *Horticultural Superintendent, Auckland.*

THE productivity of the fruit tree is influenced by numerous factors, such as temperature and climate; the texture and structure of the soil and the amount of organic matter, moisture, and acids it contains; the available supply of plant nutrients; and the extent of attacks by insects and diseases. Man can have little effect on temperature and climate but may greatly influence the other factors and by good management secure results favourable to the growth of his orchard.

THE general maintenance of the home orchard from year to year consists of cultural operations, maintenance of soil fertility, manuring, pruning, and disease control.

Cultural Operations

Cultivation is necessary to assist soil aeration and the elimination of soil acids and gases. Cultivation fosters moisture conservation by the elimination of weeds and other volunteer growth and by the provision of a soil mulch, but also facilitates the evaporation of excess soil moisture and is the means of incorporating green material with the soil to provide organic matter.

As the home orchard is seldom of sufficient size to permit of mechanical cultivation, the spade and hoe will be the main implements used by the average home gardener.

The trees should be dug round at least twice a year, in autumn and early spring, and kept hoed throughout the summer. On the larger farm orchards which have been planted to permit mechanical cultivation, the orchard should be ploughed in the autumn, double disced in the spring, and kept cultivated during the summer.

Cultivation around such shallow-rooted trees as citrus, passion fruit, tree tomatoes, and berry fruits should not be to a greater depth than 4in., as their roots are very close to the surface. Because of the disruption caused to the young fibrous feeding roots, spring or summer ploughing is not recommended, and spring digging should be shallower than in the autumn.

The first article of this series, published last month, dealt with the establishment of a home orchard. In this article cultivation, pruning, and other details of general maintenance are discussed, and next month measures to control pests and diseases will be detailed.

Soil Fertility

The fertility of a soil is influenced to a great extent by the amount of organic matter which it contains. Organic matter is the main source of energy of the soil population, or soil bacteria, and from it the main supply of nitrates is provided by the action of the bacteria. The presence of organic matter, or humus as it is commonly termed, tends to increase the water-holding capacity of the soil in dry weather, yet facilitates the drainage of excess soil moisture. Furthermore, it improves the aeration and warmth of the soil and increases its power of retaining dissolved food substances.

Organic matter may be said to be the basis of soil fertility and many soil troubles may be traced to a deficiency of it. Organic matter may be added to the soil in the form of compost, lawn clippings, leaf mould, and stable and other animal manure, or by growing and turning into the soil some suitable green crop, such as blue lupins, field peas, and vetches, oats, or mustard.

The correct time to sow the green crop will depend on circumstances. The most satisfactory period under normal conditions is during January or February so that the resultant crop will be ready (when the stems or straw have begun to develop fibre) for turning into the soil in the late autumn. On soils prone to be very wet in winter it is an advantage to have a crop such as blue lupins growing through the winter to act as a dewatering agent; for that purpose the crop should be sown in March and turned into the soil in August. Fig. 19 shows an excellent crop of lupins ready to be incorporated into the soil before the planting of orchard trees.

The most satisfactory method of incorporating green matter in the soil is by discing (on large areas), rotary hoeing, or chopping with a spade and then digging in. Ploughing the green crop under or trenching it, especially in the spring, is not recommended, as the decomposing "blanket" of green matter tends to increase soil acidity and temporarily decrease the available supply of nitrogen when it is required by the tree in increasing quantities.

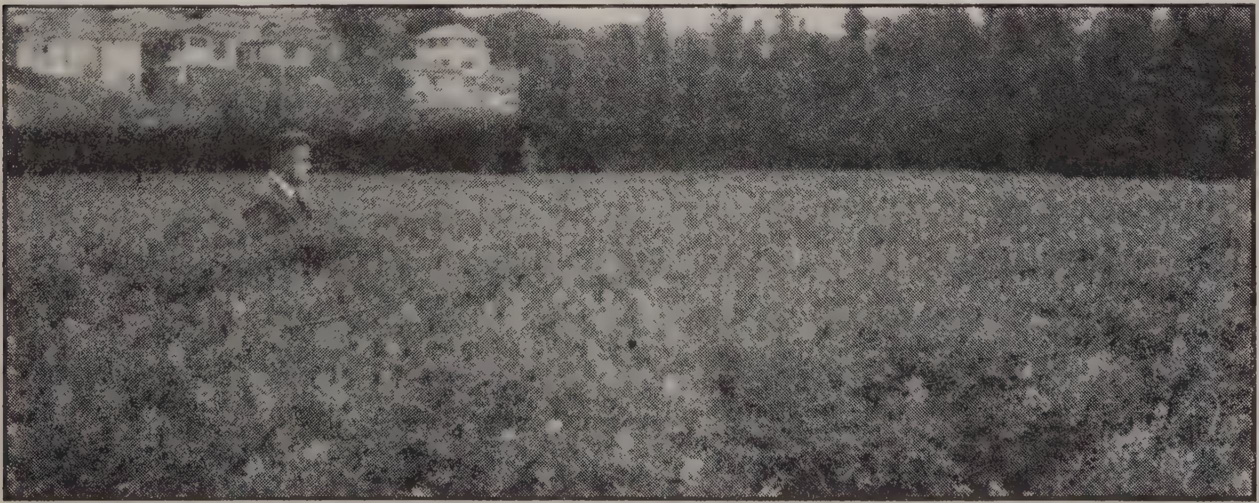

Fig. 19—An excellent crop of blue lupins which will be turned under before fruit trees are planted.

MANURES AND FERTILISERS FOR ORCHARDS . . .

The soil may be regarded as the natural storehouse of plant foods. However, as crops are produced the elements required as plant foods are being continually withdrawn. Eventually those which are in greatest demand, or in shortest supply, become more or less depleted and the balance of plant foods is upset.

Withdrawals of plant nutrients require to be replaced if successful cropping is to be continued. Wise soil management and the addition of organic matter assist the liberation of further supplies of plant foods by the natural processes in the soil.

Manuring

Where natural replenishment is insufficient the land should be manured to offset the continual losses of soil fertility. Farm animal manures, plant and other refuse, meat works manures, natural and mineral deposits of fertilisers, as well as chemical fertilisers, constitute the chief means by which replenishment may be made.

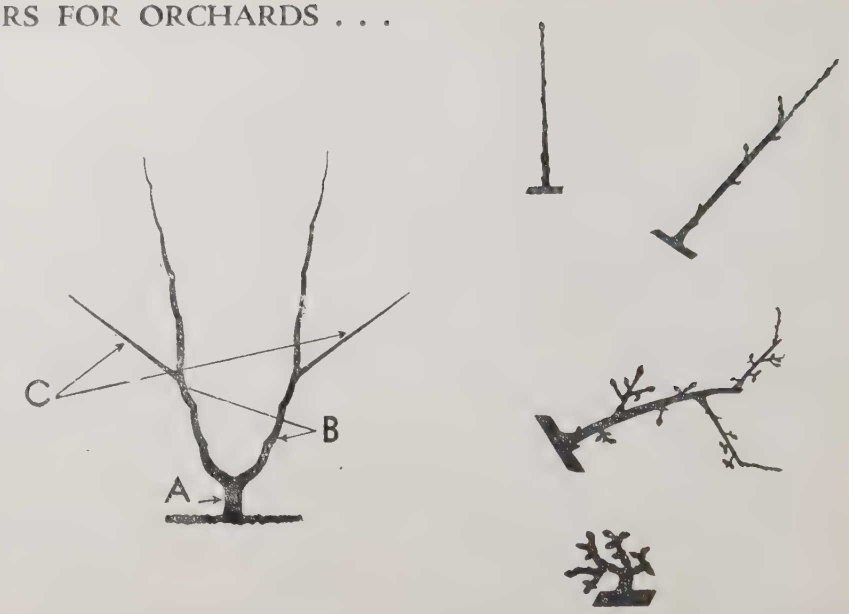

Fig. 21—Classification of tree parts. Left, permanent parts: A, trunk; B, leaders; C, fruiting arms. Right, temporary parts: Top, one- and two-year shoots; centre, a lateral; bottom, a spur.

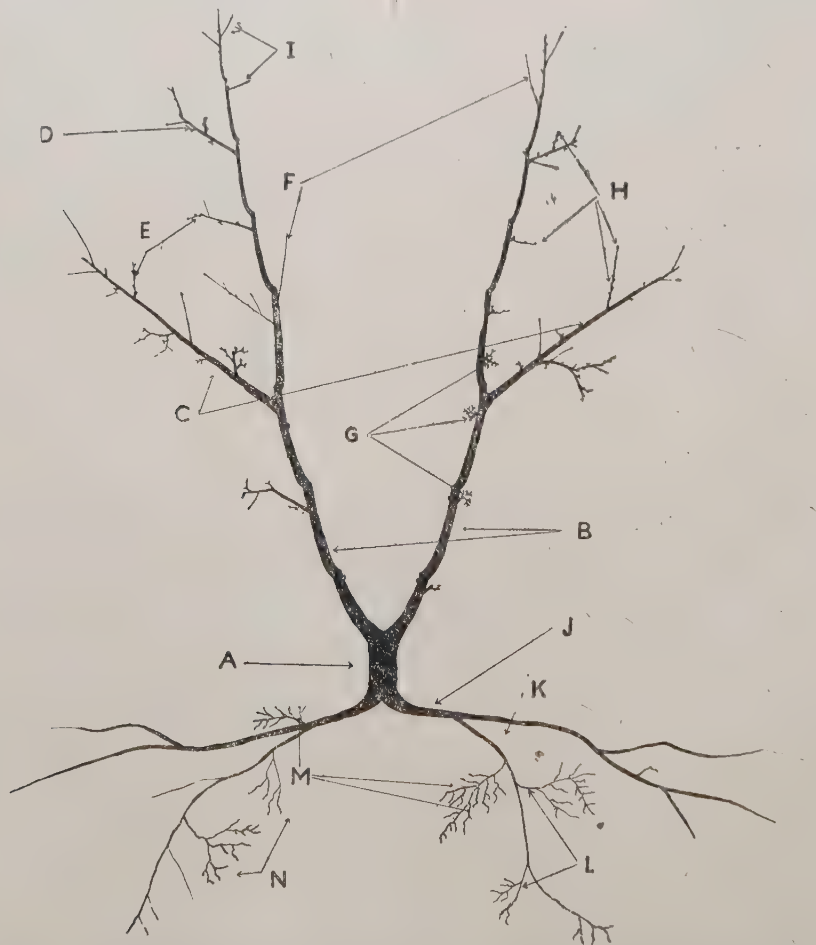

Fig. 20—Definition of tree parts: A, trunk; B, leaders; C, fruiting arms; D, lateral; E, fruit twigs; F, wood shoots; G, fruit spurs; H, fruit buds; I, leaf buds; J, main root; K, secondary root; L, lateral root; M, fibrous root; N, hair roots.

Manures and fertilisers may be classified as nitrogenous, phosphatic, and potassic, according to the main plant food they contain, or as combination manures in which more than one type of plant food exists in quantity. Those which combine the three main elements, nitrogen, phosphorus, and potassium, are usually termed complete fertilisers.

Examples of the different groups are:—

	Nitrogen per cent.	Phosphate per cent.	Potassium per cent.
Nitrogenous Fertilisers			
Sulphate of ammonia ..	20.6		
Nitrate of soda	16.0		
Dried blood ..	12.8		
Meat meal ..	10.0	3.0	
Phosphatic Fertilisers			
Superphosphate		20.1	
Basic slag (20 per cent. grade)		20	
Bone char ..		29.7	
Bonedust ..		22.5	
Potassic Fertilisers			
Sulphate of potash ..			48.6
Muriate of potash			50.4
Potash salts ..			20 to 30
Kainit ..			14
Wood ashes ..			8 to 10
Combination Manures			
Blood and bone (average) ..	7	10.6	
Fish fertiliser (average) ..	6.0	12.5	
Animal manures	Considerable variation according to condition		
Fowl	18 to 36	11 to 13	13 to 20
Sheep ..	12 to 16	6 to 7	3 to 4
Pig	9 to 16	2 to 13	3 to 8
Horse ..	9 to 12	7 to 8	2 to 9
Cow	4 to 10	2 to 4	1 to 2
Cereal litter ..	6 to 20	4 to 7	11 to 24
Leguminous litter	27 to 45	7 to 9	13 to 40
Leaf compost	18 to 30	4 to 7	4 to 9

Nitrogen is mainly concerned in the vegetative growth of the plant. It promotes larger leafage, the rapid extension of growth, and the setting of fruit. It is usually in shortest supply in early spring, when it is needed in greatest supply by the plant. If present in excess it tends to promote rank, coarse, sappy growth, a weak constitution, and susceptibility to disease attack, and it also has a detrimental effect on the keeping quality of fruit. Nitrogen deficiency is associated with a stunting of growth, yellowish-green leaves, early defoliation, and poor fruit setting.

Phosphates greatly stimulate root activity, which hastens plant growth, particularly in the early stages. They assist fruit bud and grain formation. Phosphate deficiency is associated with stunting of the root shoots, dull green leaves with a bronze effect, and often imperfectly-developed blossom.

Potash is needed for the efficiency of the leaf and to assist in carbohydrate formation. It counteracts the ill effects of nitrogen excess and produces a sturdier plant better able to resist disease. It also produces a finer texture in fruit, promotes the development of colour, and improves its keeping quality. A deficiency is associated with leaves of a dull colour. Fruit trees suffering from potash deficiency show leaf scorch and early defoliation.

It is sound practice to use complete fertilisers—that is those containing nitrogen, phosphorus, and potassium—in preference to a fertiliser containing but one of the elements.

It is not possible to make manurial recommendations which will be applicable under all circumstances, but the following may be taken as a guide for the average tree:—

	RICH SOILS lb.	AVERAGE SOILS lb.	POOR SOILS lb.
Apples, Pears, Apricots			
Sulphate of ammonia	—	1	1½
Superphosphate ..	2	2	2½
Blood and bone ..	2	2	2½
Sulphate of potash	1	1	½
Total	5	6	7
Peaches, Plums, and Sub-tropical Fruits			
Sulphate of ammonia	½	1½	2
Superphosphate ..	1½	1½	2
Blood and bone ..	2	2	2½
Sulphate of potash	1	1	½
Total	5	6	7
Citrus			
Sulphate of ammonia	1	1½	2
Superphosphate ..	1½	1½	2
Blood and bone ..	1½	2	2½
Sulphate of potash	1	1	½
Total	5	6	7

Applications of the mixtures recommended may be increased up to 15lb. a tree according to size and cropping capacity. For berry fruits the rate of application should range between 4 and 8oz. a bush, with the same amount to each yard of strawberry row.

Only one fertiliser in each group has been quoted, but they may be replaced by others from the same group.

It has been fairly well established that the majority of plants take up the greater portion of their food requirements, or nutritional elements, from the soil during the early part of the growing season. It is considered that the most active period of nutrient uptake in fruit trees occurs between early root activity and the setting of the crop. That rapid uptake, especially of phosphates and potash, necessitates the application of these elements sufficiently early to enable them to become available at the required time in spring. As they do not readily leach from the soil they may be applied before spring, and as they tend to become fixed in the soil at point of distribution they should be placed as near the root area as possible. It is good practice to apply and turn under fertilisers containing phosphates and potash during the late autumn ploughing or digging.

The period of nitrogen application is governed to some extent by the form in which it is used, but generally it should not be applied until growth is active because of the likelihood of loss in drainage. As it is soluble and quickly permeates the soil it may be spread as a topdressing and lightly harrowed or hoed in.

Lime

Calcium, the main element found in lime, is an important plant food. Applications of lime decrease the loss of available potash from the soil and assist in the liberation of unavailable potash. Lime has been found of advantage in preserving the availability of phosphates. It is also a corrective of soil acidity and prevents the loss of nitrates.

Agricultural ground limestone (calcium carbonate) may be applied annually in late autumn at the rate of 8oz. a square yard. Hydrated lime (calcium hydroxide) is quicker acting and more satisfactory for small home orchards and may be applied at the rate of 6oz. a square yard. Burnt lime (calcium oxide) may be used on heavy soils at the rate of 4oz. a square yard in the spring, but it is not recommended for light soils.

Pruning

Pruning is the art of modifying the natural habit of the fruit tree to improve its commercial value as a cropping unit by securing more regular and prolific crops of good-quality fruit. The main objects of the pruner may be stated as:—

1. The treatment of the young tree in a manner which will build up a vigorous, mechanically-strong framework capable of carrying

PRUNING A YOUNG TREE

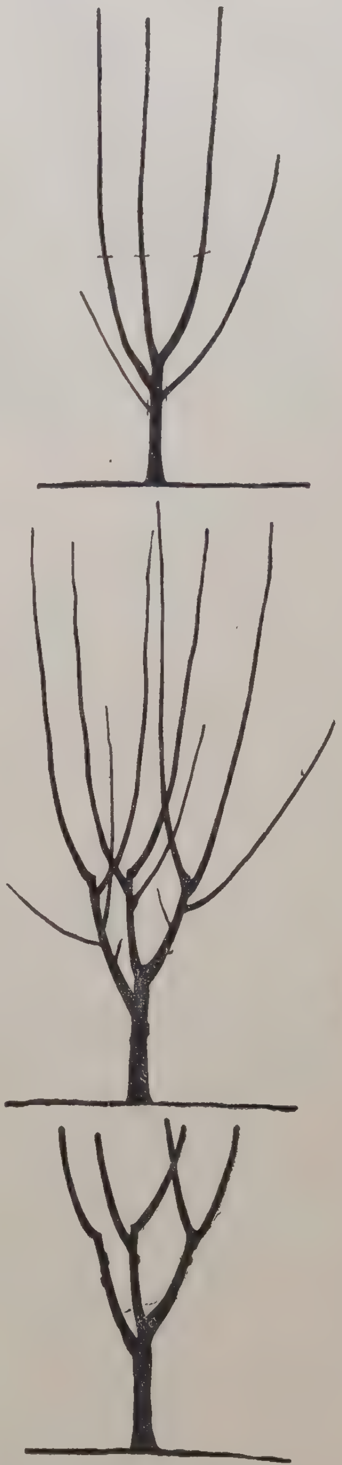

Fig. 22—Top, a young tree at the time of planting, with the suggested positions of pruning cuts marked. Centre, before being pruned at its second winter. Bottom, after being pruned at its second winter.

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heavy crops over a long period without damage;

2. To train the tree to a form which lends itself to ease and economy of management, disease control, and harvesting;
3. To provide for an even distribution of healthy fruiting wood throughout the tree during its fruiting life;
4. To remove dead, dying, and diseased wood; and
5. To maintain size and quality of the fruit.

Definition of Tree Parts (Fig. 20):—Above ground: Trunk, leaders, fruiting arms, laterals, fruit twigs, wood shoots, fruit spurs, fruit buds, leaf buds. Below ground: Main root, secondary roots, lateral roots, fibrous roots, hair roots.

Classification of Tree Parts (Fig. 21):—Permanent parts (framework): Trunk, leaders, and fruiting arms. Temporary (fruiting) parts: Wood shoots, laterals, fruit twigs, and fruit spurs.

Pip Fruits

Pip fruit trees should be pruned during the winter. For the first five or six years the primary object of pruning should be to produce a sturdy framework, and during those early years fruiting should be allowed only to an extent that does not interfere with necessary growth.

After the tree has been planted, two or three well-spaced, upright, sturdy shoots should be selected as the start of the future framework and all other growths cut away. The selected shoots, or leaders as they then become, should be shortened, about three-quarters of the previous season's growth being cut off (Fig. 22). The pruning should be back to suitable side buds, so that the following season two healthy, well-placed shoots should spring from each leader.

At the second winter pruning about five of the best-placed and strongest leading shoots should be selected and the balance cut away. The remaining shoots, or leaders, should be shortened back to about one-third of their new growth and pruned to outside buds to increase the spread of the tree.

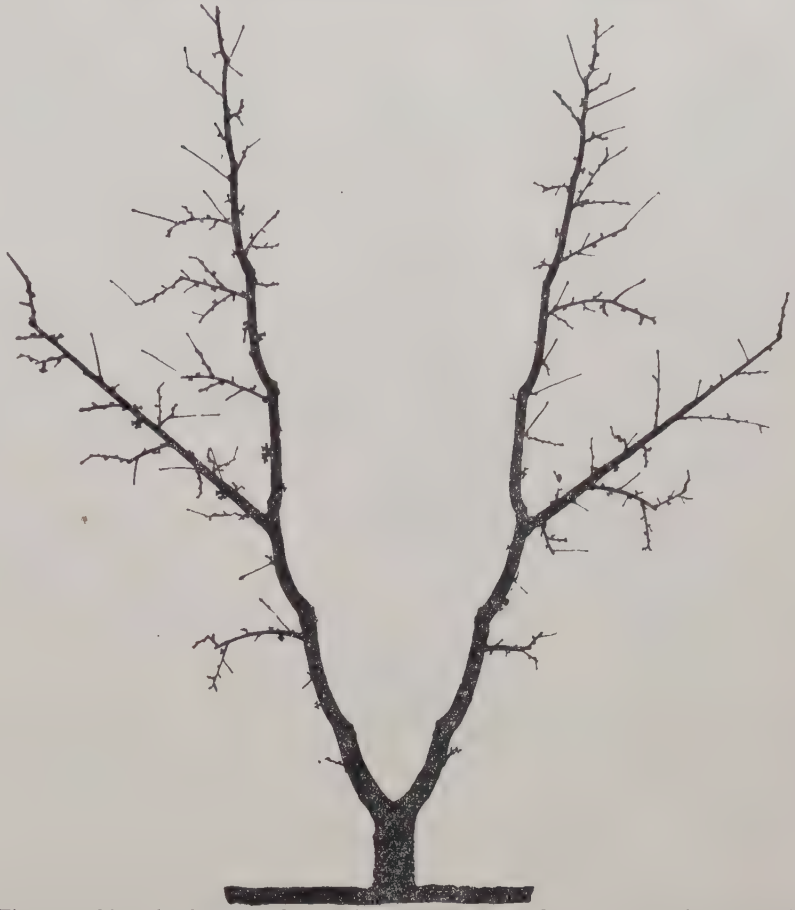


Fig. 24—Two leaders on the modern, erect type of tree. The short, sturdy arms do not need propping. The fruit is carried on the outside ring of the leaders, where it is more easily sprayed and picked.

The ultimate aim should be to secure a tree with about six or seven well-spaced, strong leaders, each carrying one sturdy fruiting arm; the erectness of the leaders is important for strength. Fig. 25 shows a young tree which is unbalanced because faulty pruning in the early stage has allowed one strong leader to dominate the rest of the tree. The erectness of this leader has caused it to outgrow the others.

If the tree has made good growth a start may be made at the third winter pruning to form the fruiting arms. Having selected the strongest and best-placed shoots for the leaders, all other competing shoots should be cut right back and only a few of the lighter twigs on the older wood left as laterals. To secure a well-placed fruiting arm, a bud on the outside of each leading shoot is selected about half-way up the shoot, which is then pruned back to the first bud above on the inside of the shoot. The effect of this pruning should be to give a strong, erect, leading shoot and a slightly-weaker fruiting arm shoot growing at an angle from the selected bud on the outside of the leader (Fig. 27).

Both the leading and fruiting arm shoots are shortened by half their

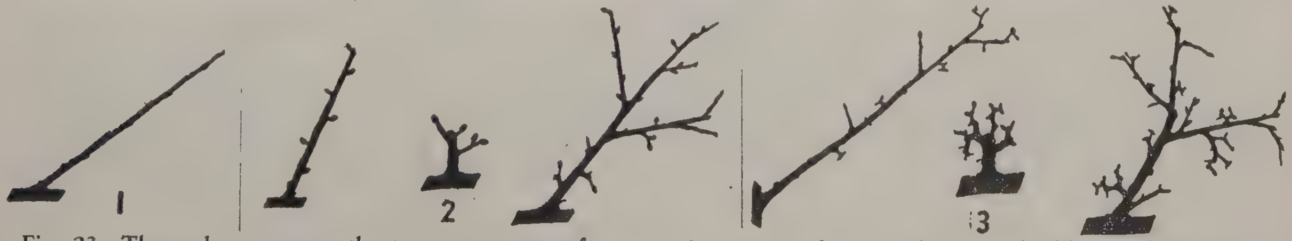
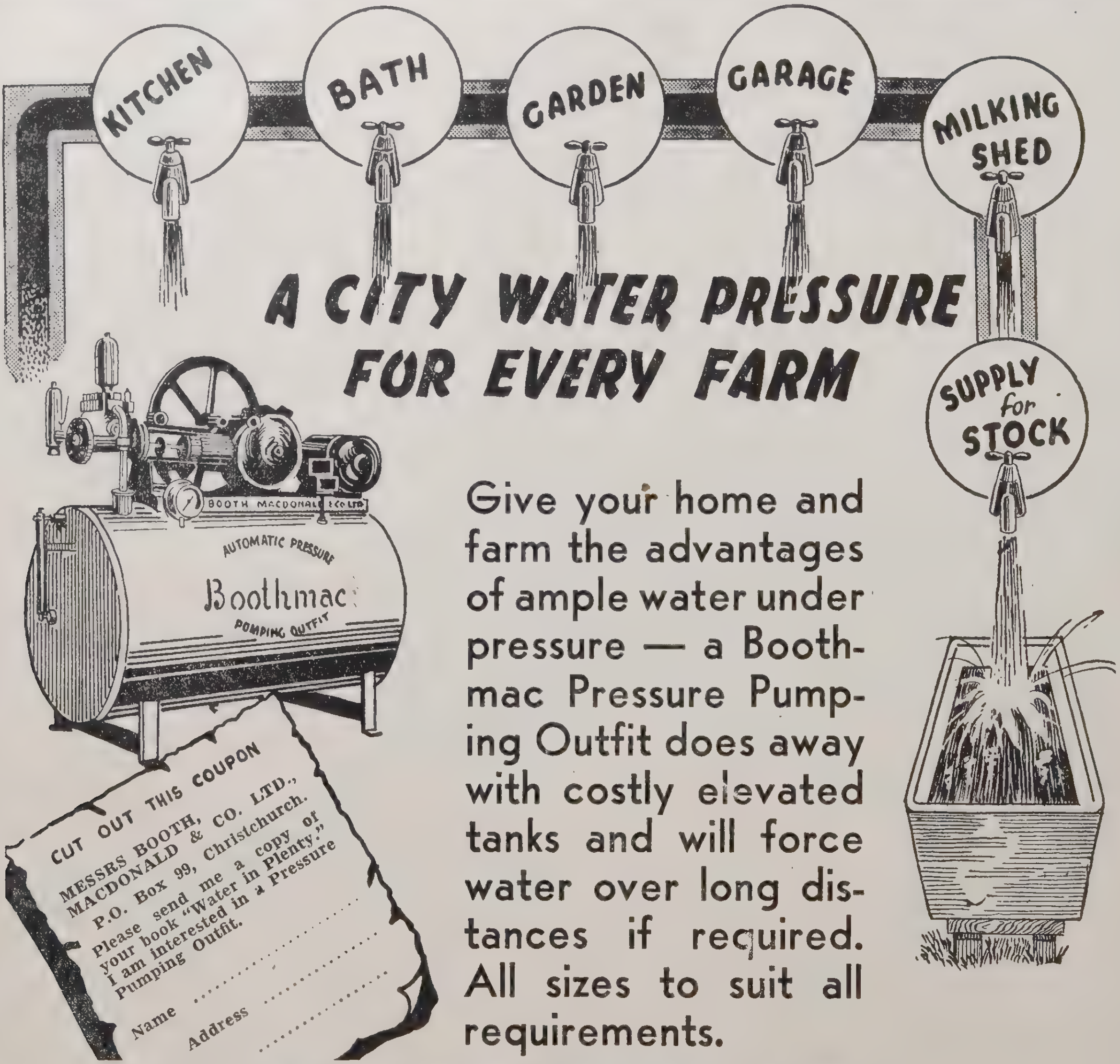


Fig. 23—Three classes among the temporary parts of a tree: 1, an annual wood shoot; 2, healthy, well-conditioned wood; 3, old, exhausted wood.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length to an outside bud at the fourth winter pruning.

A common mistake in training a tree is to have too many leaders and too great a spread of the tree, with the result that the leaders tend to be weak and spindly and unable to stand up under the weight of the crop. The diagram of half a tree in Fig. 26 illustrates the disadvantages of having too many leaders, which may be summarised as follows:—

1. With many leaders each tends to be weak. Frequent breakages of leaders are likely to occur under the weight of the crop, and propping is required.
2. To lessen the overcrowding, leaders are usually brought out at an angle, which increases the weakness of the limb and its likelihood to bend and break under the weight of the crop.
3. As the leaders bend outward under the weight of successive crops the fruiting wood tends to become established inside the ring of leaders, which makes both disease control and harvesting more difficult.
4. Too many leaders preclude the development and extension of laterals because of overcrowding, and therefore necessitate dependence on the spur system of fruiting.

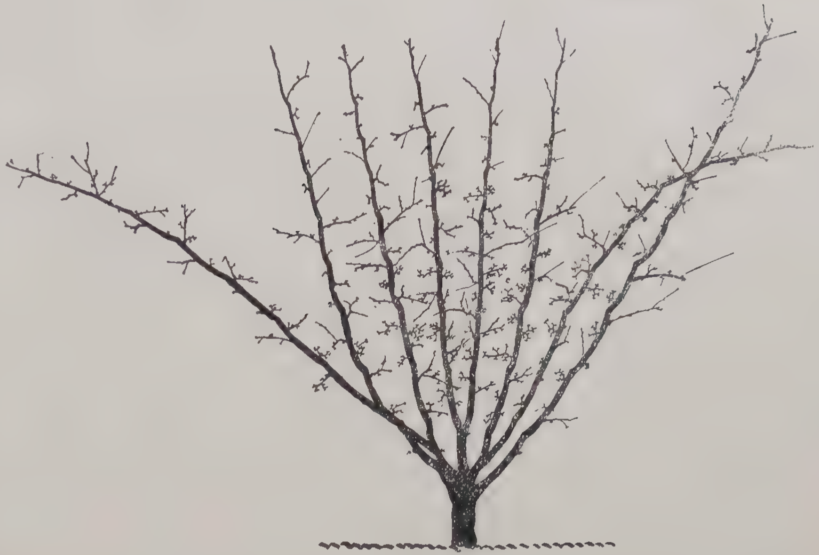

Fig. 26—The disadvantages of a tree with too many leaders. Propping would be required—a costly item—and the weak leader on the left would be likely to break under the weight of the crop. The tree is overcrowded, leaving no room for laterals and impeding spray penetration. Spreading branches impede cultivation.

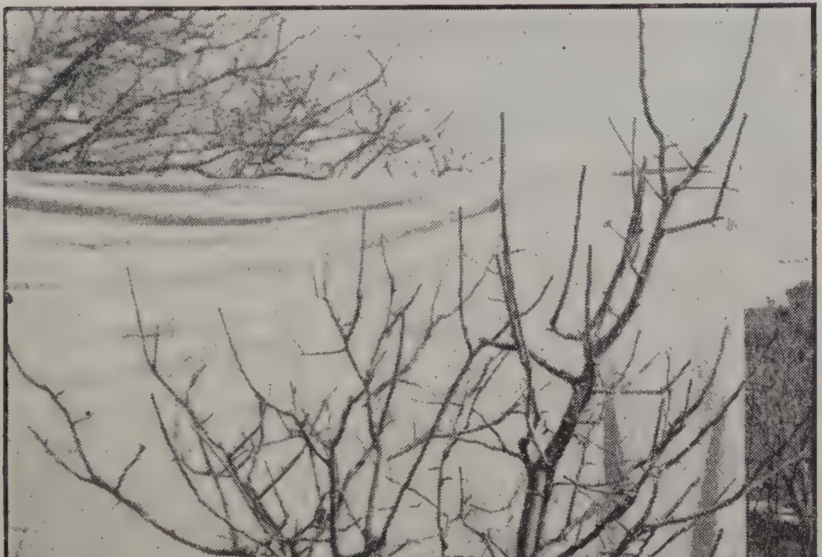

Fig. 25—An unbalanced young apple tree. An erect leader has outgrown the others and now dominates the tree.

5. Overcrowding causes shading of fruit and poorer colour, tends to prevent effective spray penetration and coverage, and leads to inadequate protection against insect and disease attack.
6. Spreading leaders increase difficulty of cultivation close to the tree.

The advantages of the modern, erect type of tree having few leaders are illustrated in the diagram of two leaders shown in Fig. 24, and may be summarised as follows:—

1. Upright leaders mean strength.
2. A limited number of leaders secures greater weight in each leader, with greater ability to stand up under the weight of the crop.
3. Leaders well spaced enable full development of desirable lateral growth.
4. Development of one sturdy fruiting arm to each leader increases the fruiting area within easy reach.
5. Sturdy leaders and fruiting arms do not require propping, and fruiting arms are up out of the way of cultivating equipment.
6. Fruit is produced outside the ring of leaders and so secures maximum air and sunlight, spray penetration and coverage are facilitated, and the fruit is more easily picked.

As the tree becomes older the leaders and fruiting arms become furnished with laterals, twigs, and spurs, which constitute the fruiting parts of the tree. While the spurs and laterals are young and vigorous they carry excellent fruit, but as they age and weaken they become poor conductors of plant food and fruit carried on them is likely to be small and of poor quality. It would therefore appear reasonable that the old and exhausted wood should be cut away and young, vigorous wood encouraged in its place, but unfortunately the opposite appears to be the rule in the average home orchard, and the old wood is carefully preserved year after year.

The system of pruning recommended envisages the continual removal of fruiting wood as it becomes exhausted and the refurnishing of the tree with young, healthy laterals and twigs. Laterals are encouraged in preference to spurs, as they are better conductors of plant food and are more easily renewed when they become aged.

In the treatment of the bearing tree the temporary parts are divided into three classes (Fig. 23):—

3. **Old and exhausted fruiting wood;** each winter the greater part of this spent wood is cut away to promote new growth.

2. **The present healthy fruiting wood,** which is shortened where necessary to preserve its vitality or to prevent overcrowding.

1. **The future fruiting wood or new growth,** which is thinned out where necessary to prevent overcrowding, those remaining being left unshortened for the first year; that has the effect of causing them to develop fruit buds along their length the following year.

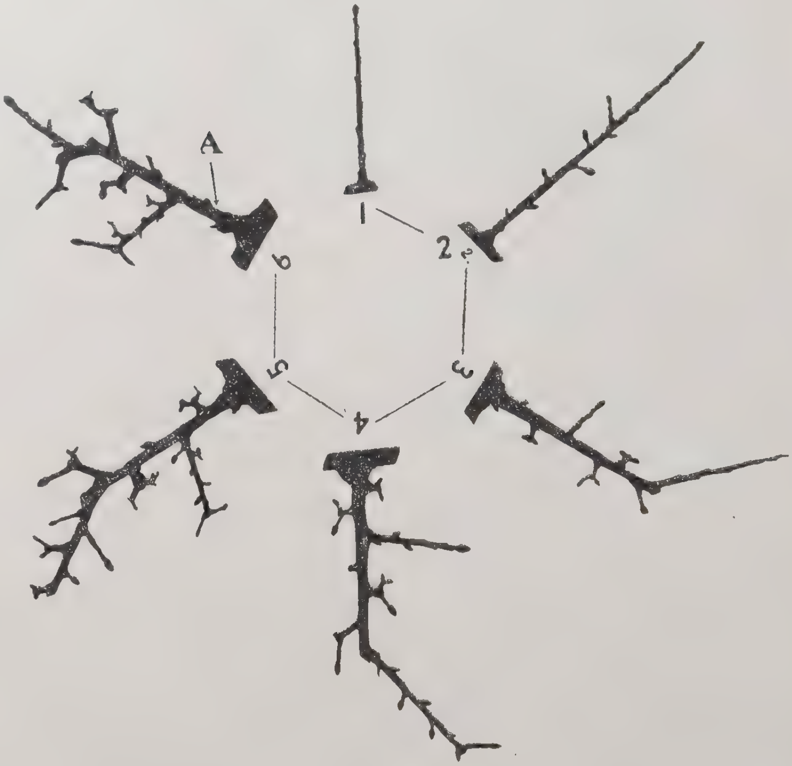

Fig. 28—Six-year cycle for refurnishing apple and pear trees. A indicates spent wood to be cut away.

The cutting or shortening of all annual wood shoots is likely to cause excessive growth and is also detrimental because of the removal of much valuable early leafage which is required to assist fruit setting.

The purpose of the temporary wood is fruiting, and greater and earlier fruit bud formation is encouraged by leaving the new lateral growths and shoots unshortened for the first year. Fig. 29 shows the fruit bud development on unpruned laterals of Gravenstein, Sturmer, and Jonathan.

In brief, the lateral shoot is grown, encouraged to fruit early, and after a short fruiting life is cut back and renewed; the cycle then begins again. Fig. 28 illustrates the cycle of refurnishing for apples and pears. A rationalised system of refurnishing will keep the tree sufficiently vigorous without causing excessive growth. Should a tree be too vigorous, less new growth should be thinned out; conversely, as the tree becomes stagnated more cutting back of old wood is necessary to promote increased growth.

Old trees which have become stagnated and devoid of new extension growth may be rejuvenated by that method of refurnishing. For the first winter treatment of such trees 30 to 40 per cent. of the exhausted wood should be cut away to promote new growth. The balance of old spurs and

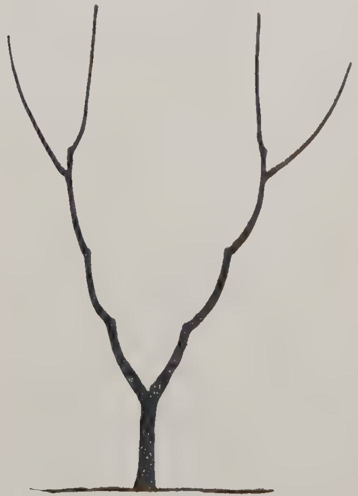

Fig. 27—The method of pruning leaders to get fruiting arms at the desired position.

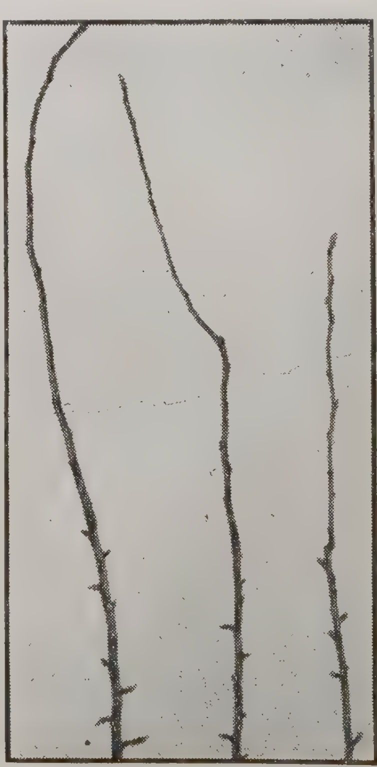

Fig. 29—Unpruned laterals showing fruit bud development. From left: Gravenstein, Sturmer, and Jonathan.

laterals should be cut back and renewed during the following three to four years, and the normal cycle of refurnishing over a five- to six-year period then followed.

Stone Fruit

The training of a young stone fruit tree broadly follows the outline given for pip fruits. It is essential that a sturdy framework be built up while the tree is young. Peaches, nectarines, and plums are usually more vigorous in growth than pip fruits, and the building of a sturdy framework presents much less difficulty.

After the planting of the young tree, three or four strong shoots should be selected as the basis of the framework and all others cut away. The selected shoots should be pruned back to outside buds, about three-quarters of their length being removed.

Frequently, because of faulty treatment in the nursery, trees are received which present a problem to the buyer when he comes to prune them after planting. It is essential that the growth be started on sound lines, and if the placement of the main shoots is unsatisfactory, or the growth too uneven for use to be made of the required number of shoots in the first year, it may be necessary to select only two or, in extreme cases, to discard all and cut back to a single rod.

Fig. 36 shows a well-shaped tree as secured from the nursery and the right treatment at pruning.

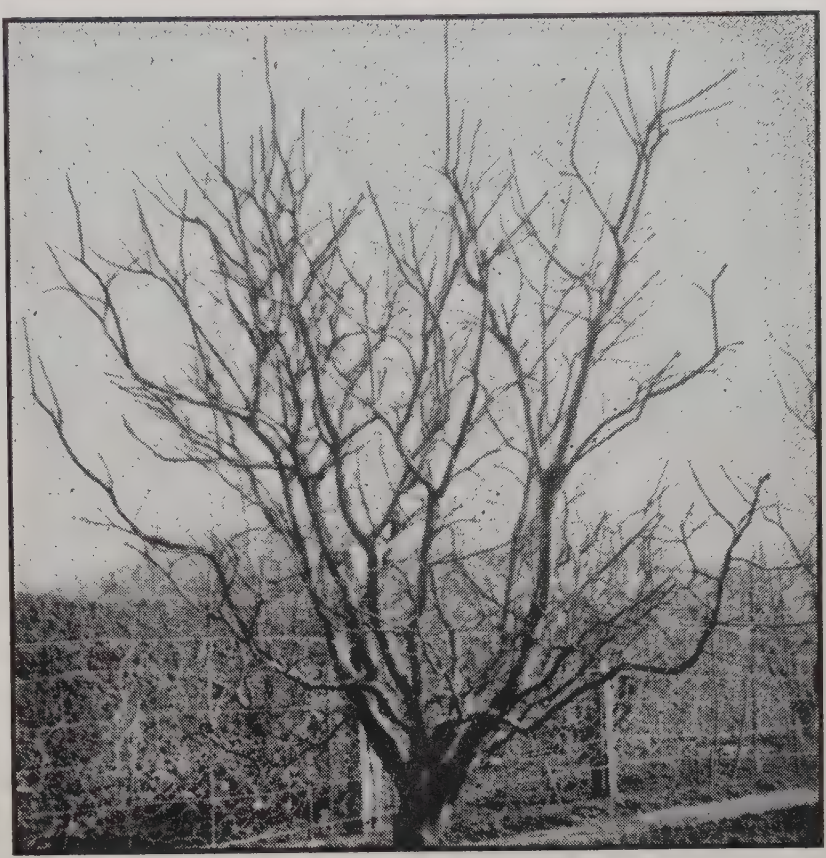

Fig. 31—A vigorous young quince tree, well pruned except that it has too much "top" and all laterals have been shortened.

From five to seven leaders are sufficient, and in districts where very strong growth is made by peaches, nectarines, and plums the framework may be built rapidly by leaving the leaders unshortened for three or four years after the second or third winter pruning. However, though the annual extension growth of the leader may be left unshortened, most light laterals on this growth should be cut right back for the first year. Apricot and cherry trees are seldom as strong-growing as peaches and plums, and their framework should be built by annual pruning. Fruiting arms should be developed on the outside of the leaders as for pip fruits.

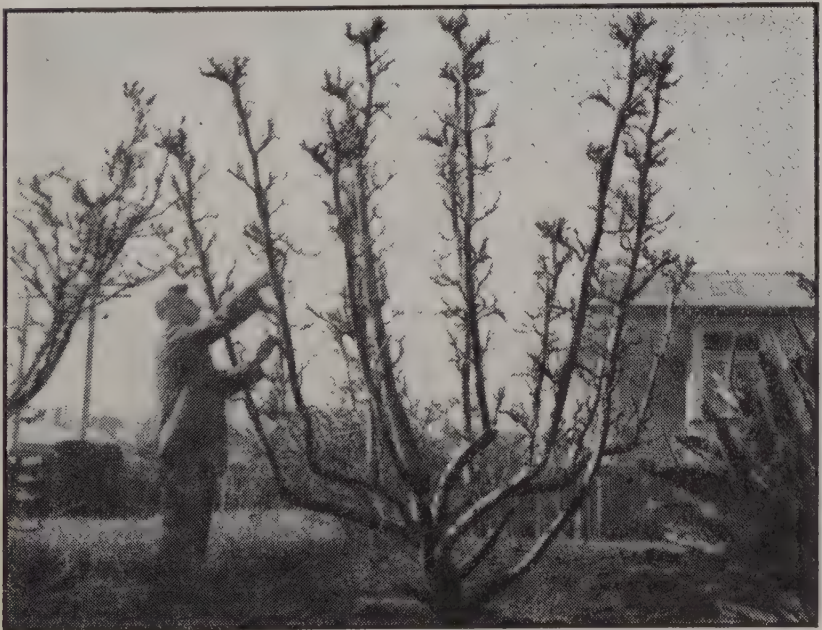

Fig. 30—An apple tree pruned on the old spur system.

The treatment of the bearing tree once the framework has been established satisfactorily varies according to the fruiting habit of that kind of stone fruit.

Peaches and nectarines fruit only on lateral growth made the previous season, and pruning consists of the removal of the two-year-old laterals to induce new growth and the thinning out of the one-year-old wood where necessary to prevent overcrowding. At times the whole of the light lateral wood along a fruiting arm or heavy lateral may be one-year-old, and if left

CONTRASTS IN PRUNING

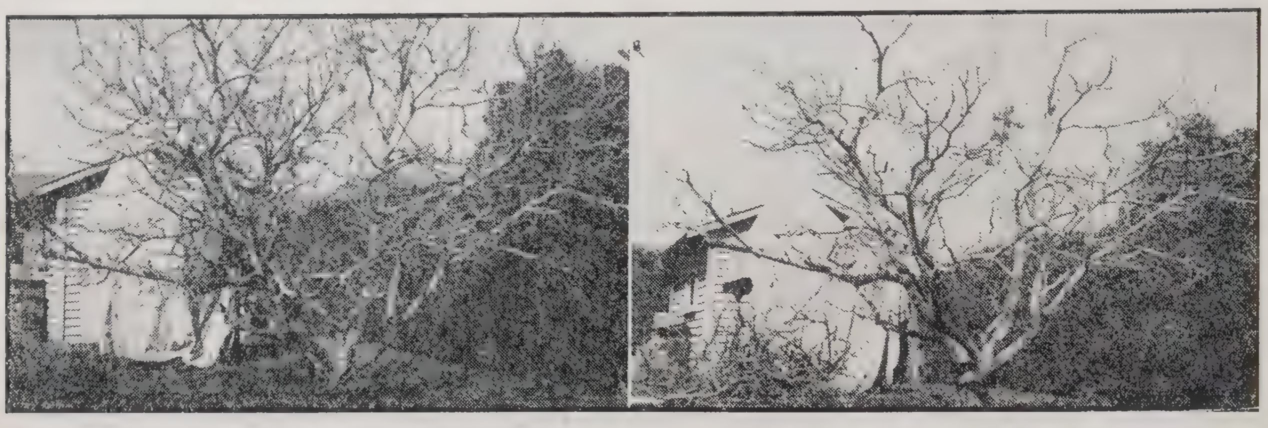

Fig. 32—Left, a typical home orchard tree that had been pruned by the owner. Right, the same tree after being repruned to remove spent fruiting wood and crowded limbs.

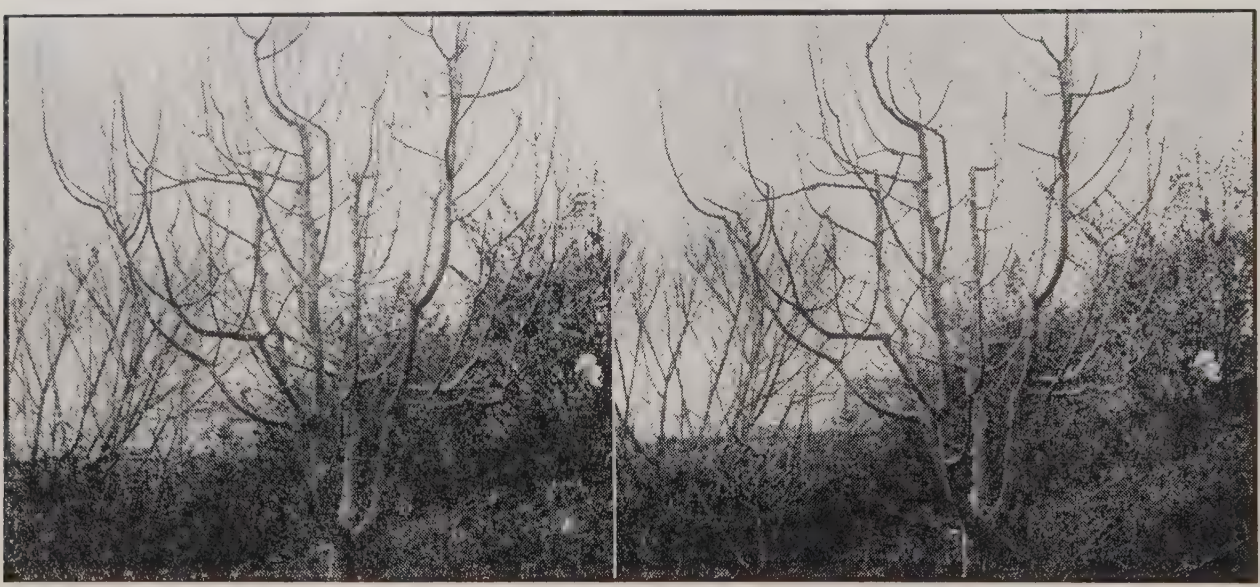

Fig. 33—Left, a sturdy seven-year-old Gravenstein apple tree before being pruned. Right, the same tree after being pruned; note the sturdy leaders and arms.

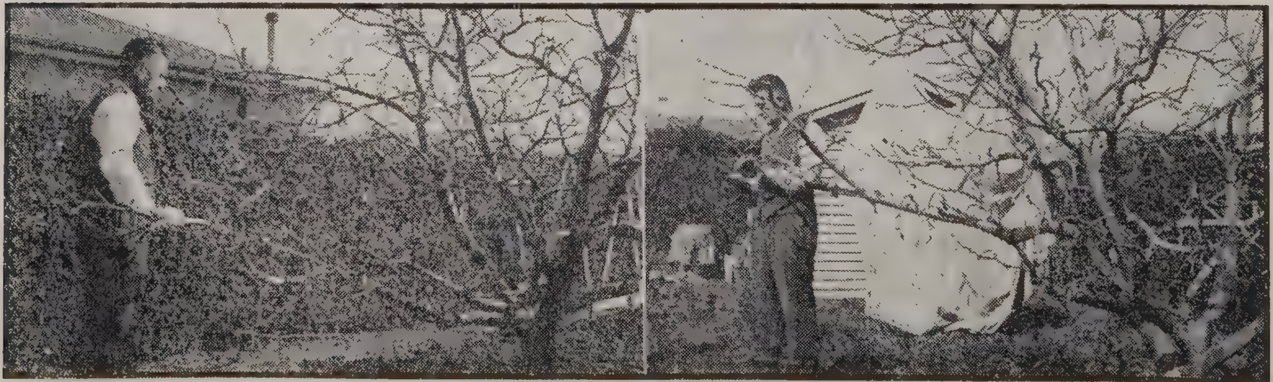

Fig. 34—Left, this fruiting arm has been brought out too near the ground and under the weight of a crop lies on the ground; it should be cut back to the trunk. Right, a fruiting arm at a better height.

without thinning, the whole of it becomes two-year-old and needs to be cut away at the next winter pruning. The correct treatment would be to thin out half of this wood the first year and leave half for fruiting; the following winter the laterals left for fruiting should be cut out and the new ones which have grown should be left for fruiting. These fruits require a heavy annual pruning, and usually it is necessary to cut back more than half of the lateral growth at each pruning. Fig. 37 shows lateral growth of a peach before and after pruning. Failure to cut away sufficient lateral growth results in the lower parts of the tree becoming devoid of fruiting wood and all the new growth being at the top of the tree; should that happen, the leaders should be shortened sufficiently to cause new growth to break out lower down and so refurnish the tree.

Plums, apricots, and cherries fruit mainly on spurs of two years and older. Refurnishing should be carried out over three to four years by cutting back 25 to 30 per cent. of the older spurs and laterals each year. As with pip fruits, robust fruiting laterals are to be preferred to spurs, which soon become weakly and carry poor-quality fruit. Vigorously-growing plums are often left unpruned and eventually become a tangled mass of growth. Fig. 38 shows part of an unpruned tree and the necessary thinning out.

Citrus Fruits

The belief that citrus trees do not require pruning is fairly common. The result has been the decline of many trees soon after reaching maturity because of overcrowding of fruiting wood and borer obtaining a hold.

Though it is seldom necessary to prune citrus trees as heavily as pip and stone fruits, a moderate pruning should be carried out each year to admit sufficient light and air for the proper development of shoots, buds, and fruit.

During the first few years a strong framework should be built up. A little more care and attention is required in the building up of a strong citrus tree with well-placed leaders than with pip and stone fruits, but, if only strong shoots are selected for the leaders and all weak and unsatisfactory ones are cut away for the first two or three years, a satisfactory framework can be achieved. Lemons should be kept more open than oranges or grapefruit, but even they should not be as dense as is common.

When the framework has been built and the tree has begun regular fruiting, the pruning consists mainly of thinning out crossing laterals, all dead, dying, and diseased wood, and any heavy, upright water shoots. Most lemons are pruned in the spring when the danger of frosts is over, but the pruning of oranges is usually delayed until the fruit has been harvested.

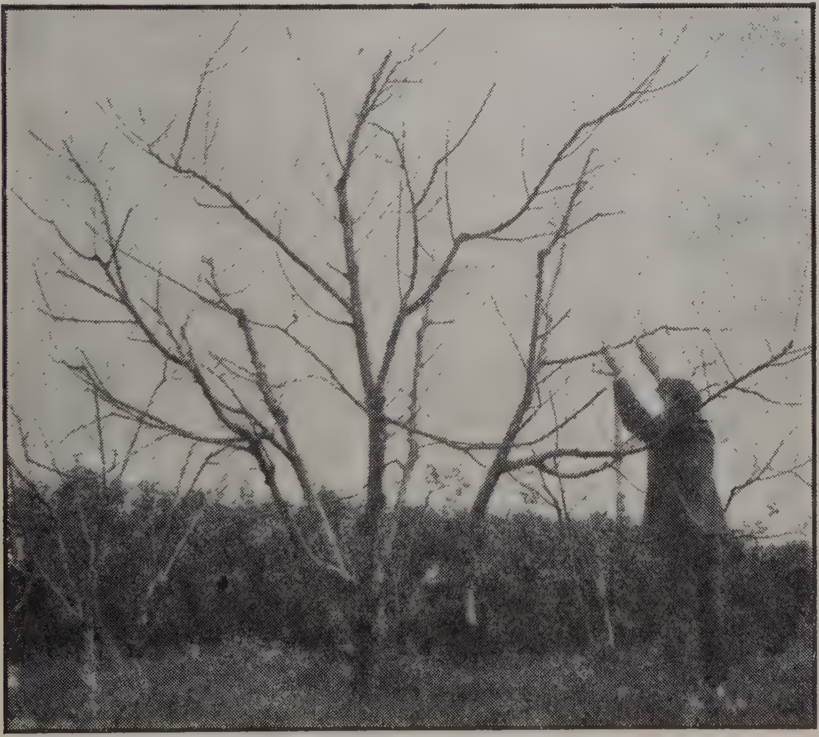

Fig. 35—Completing the pruning of a well-grown peach tree.

PRUNING A YOUNG TREE FROM THE NURSERY

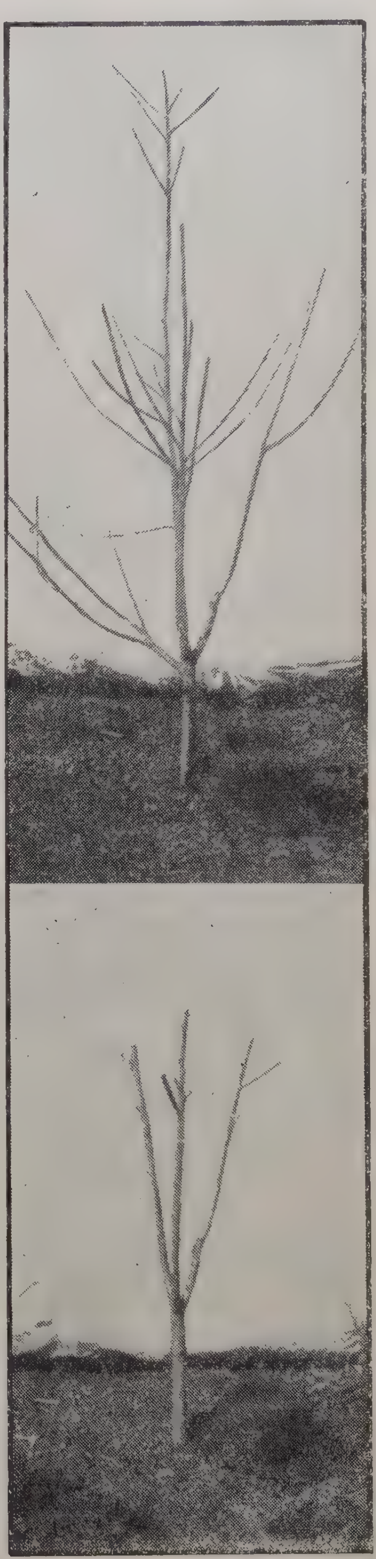

Fig. 36—Top, a well-shaped tree as received from a nursery. Bottom, the correct treatment to be given such a tree.

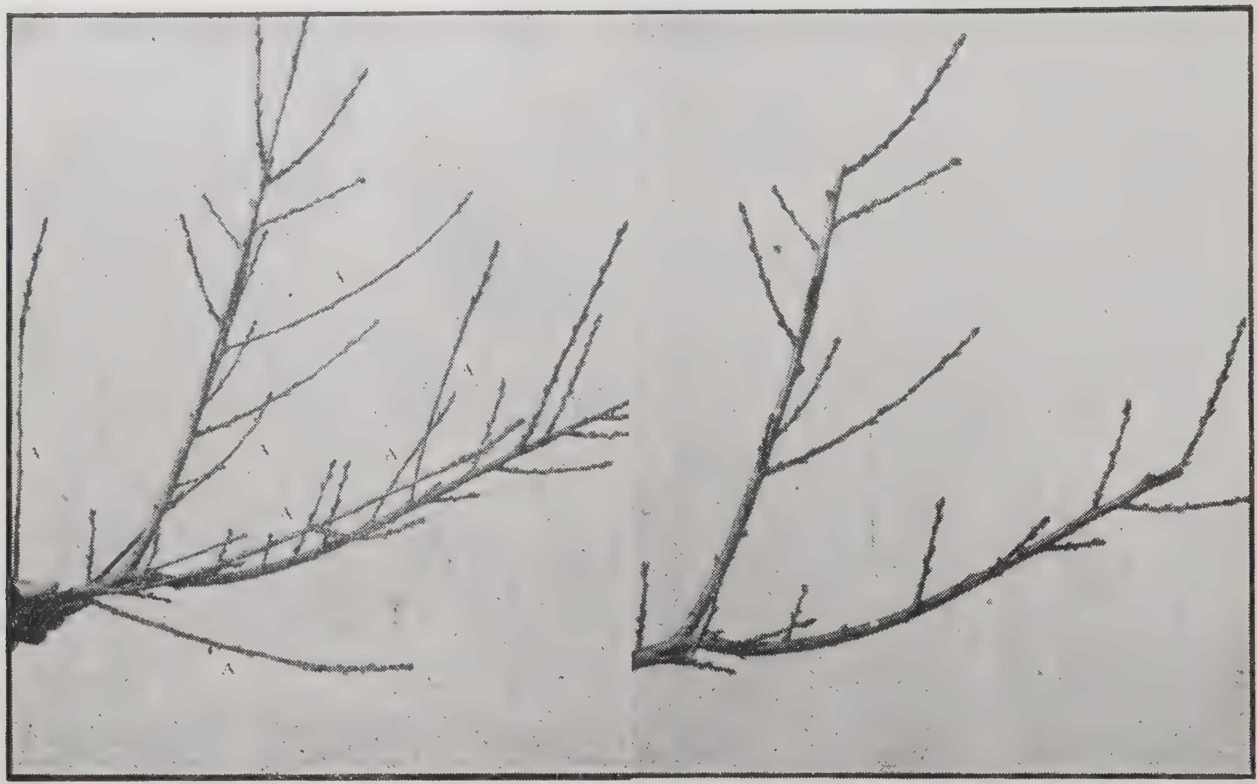

Fig. 37—Left, a peach lateral before being pruned; note the barren two-year-old wood, marked A. Right, the same lateral after being pruned.

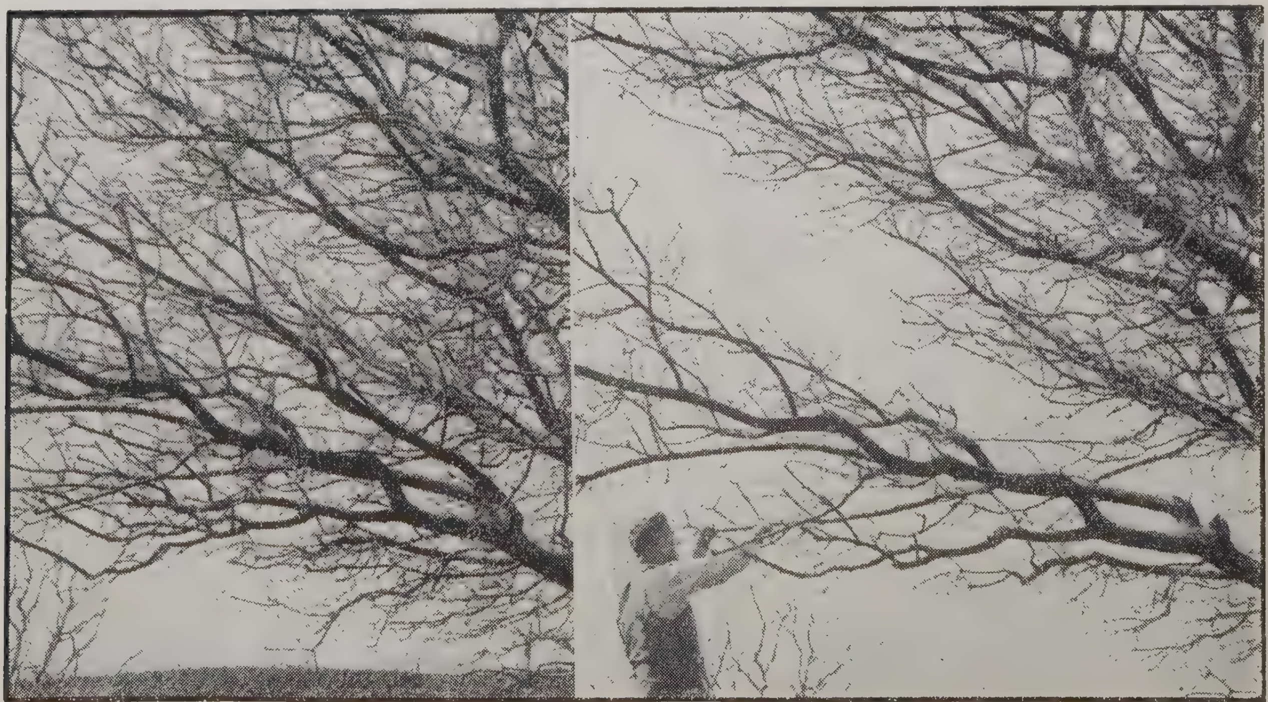

Fig. 38—Left, portion of an overcrowded plum tree, too thick and dense. Right, part of the same tree after being thinned out.

Where little pruning has been done in the past it is probable that a citrus tree will have become very dense and a fairly-heavy thinning out of branches and surplus leaders will be necessary. In such instances it is preferable that the work be spread over two or three years, it being sufficient in the first year to remove a few of the more central vertical branches and any crossing laterals.

PRUNING A CHINESE GOOSEBERRY VINE

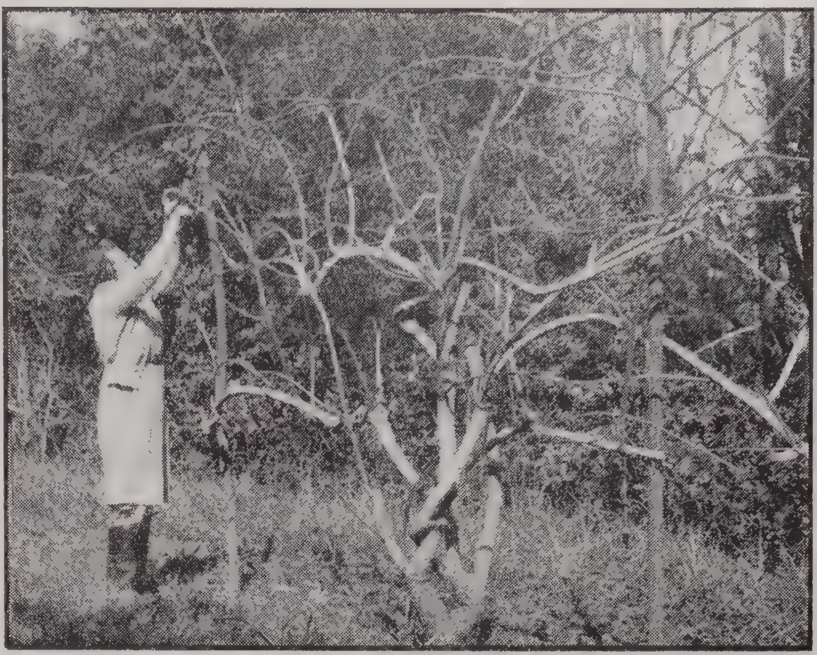

Fig. 40—Pruning being completed on a well-trained Chinese gooseberry vine.

Other Sub-tropical Fruits

Passion fruit vines are usually very little pruned by the home gardener, and before very long they become a tangled mass subject to disease attack, which frequently causes the death of the vines at an early age. The vine bears its fruit on the current season's growth, and if left unpruned, the fruiting surface becomes further and further removed from the main leading growths. The vine should be trained along or over some suitable trellis by selecting four or five of the strongest shoots to form the main leading growths, or vines. The number of vines to establish will depend on whether the plant is being trained along a fence—in which case five or six are sufficient—or over a wide rather than long area—in which case nine or ten main vines may be retained. When a framework of several main vines has been formed the annual pruning, usually carried out in early spring, consists of cutting the lateral growths back to the second bud from the main vine. Keep the plant as open as possible and, with the exception of the main vines, constantly prune off the laterals to a bud at the base. At first this pruning may appear rather drastic, but once it is realised that the fruit is carried only on the growth of the current season, the system of laying down sufficient main vines and keeping the lateral growth pruned back to these vines each spring can readily be appreciated. From time to time the main vines should be renewed by laying down a new growth coming from well back on the old vine and then shortening the vine back to the growth selected.

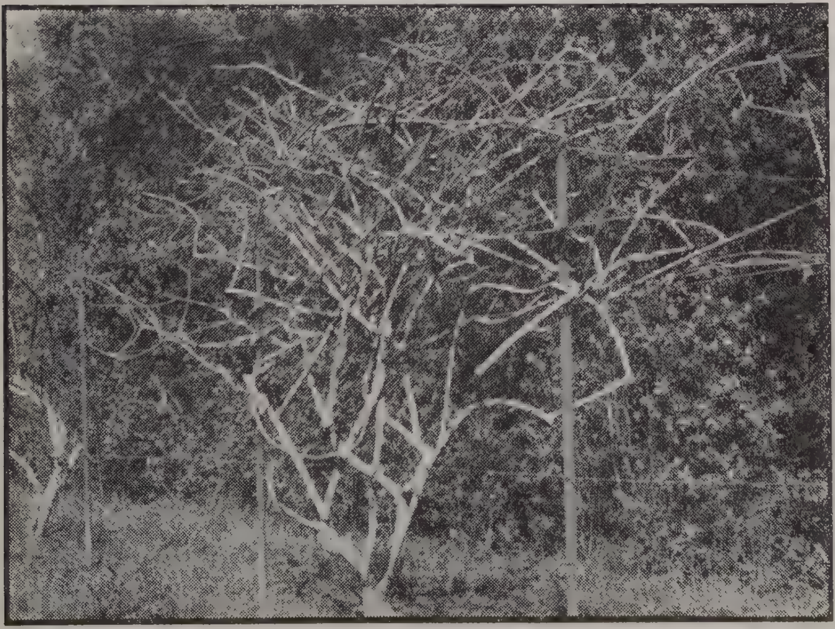

Fig. 39—The tangled mass of a badly-trained Chinese gooseberry vine.

Chinese gooseberries, like passion fruit, if left unpruned, soon become an uncontrolled, tangled mass of growth, and the fruit rapidly decreases in size. As these plants are usually extremely vigorous, sufficient room must be available to train the vines along or over a strong trellis. Unless adequate room is given, keeping the vine within bounds will be extremely difficult. In many ways the growth and fruiting habit of the Chinese gooseberry resemble those of the grapevine. A satisfactory method of training the vine is along a fence. Several main vines should be trained along the wires on either side of the main stem. From these main vines strong one-year-old laterals will develop, and in the winter a number should be retained and the balance cut back to the main vines. Those retained should be shortened to between 4 and 6ft. and tied down in a sort of bow shape. The fruit develops on current season's growths from the first four or five basal buds on these laterals, and where growth is vigorous it is advisable to stop it at a point several leaves beyond the last fruit. All growths from the tied-down laterals, whether they have carried fruit or not, should be shortened back to about a length of four buds for fruiting the following year. Laterals

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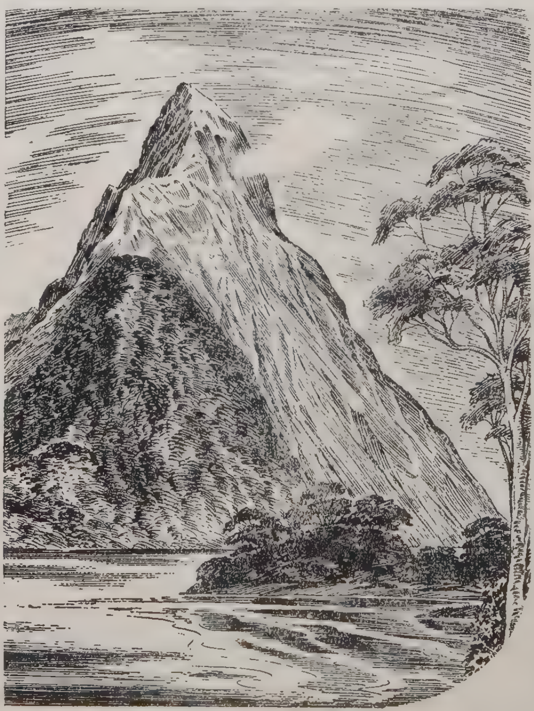

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should be renewed every two or three years by laying down a few new laterals each year. Unless the vine is pruned annually and the fruiting wood renewed, the vine will increase the quantity of fruit to the detriment of size and quality. Fig. 39 shows a badly-trained vine and Fig. 40 pruning being completed on a well-trained vine.

Tree tomatoes make very vigorous growth, especially during the first few years of establishment. The young seedling rod should be pruned at from 3 to 4ft. from ground level to encourage the development of three or four sturdy leaders. Plants raised from cuttings are relatively short and bushy, and frequently the removal of some of the lowest branches, which may be resting on the ground, becomes necessary. Having produced a strong framework of several branches, pruning of the fruiting plant consists mainly of the removal of lateral wood. As the tree tomato fruits on wood of the current season, all laterals which have fruited should be shortened back to the main limbs and heavy lateral growth. The annual extension growths of the limbs should be severely shortened once the framework has been built. Heavy annual pruning is necessary to maintain size in the fruit.

Berry Fruits

Raspberries bear the current season's fruit on the canes produced the previous season. Pruning consists of the removal at ground level of all canes which have cropped during the season, together with any weakly or diseased ones of the current season's growth. From 6 to 8 canes are usually sufficient to leave to carry the crop. Though it is the general practice to begin pruning in the late autumn, it is recommended (except for the Lloyd George variety) that pruning be carried out as soon as the fruit has been harvested. The canes selected to carry the next season's crop will then be fully exposed to the sunshine, which will assist in the ripening of the canes.

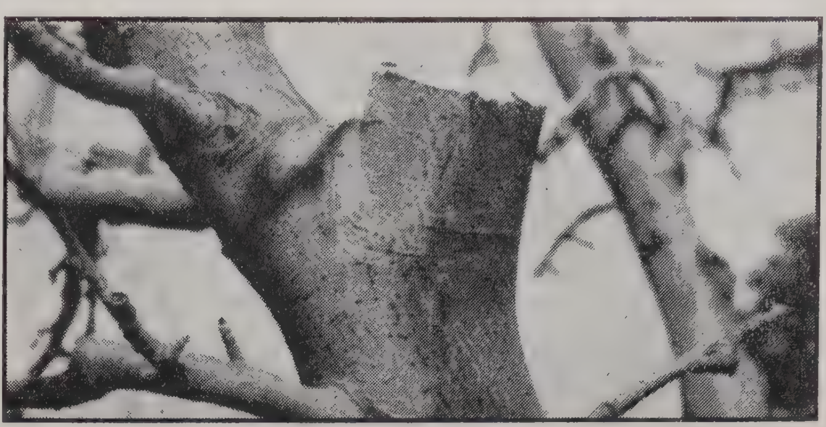

Fig. 42—This cut was made too far from the main branch, leaving an ugly stub which will not heal over readily.

Gooseberries carry their fruit on the one-year laterals and spurs from older branches. The aim of pruning is the establishment of a sturdy framework of several branches and the provision of well-placed lateral growth for fruiting. Fruit buds on new growth are preferable to those on old spurs, and the bushes should be refurnished every two years. They should be kept open, and all crossing laterals and those likely to rest on the ground should be cut away. The weeping type of plant, such as Farmer's Glory, should have the main shoots pruned to inside buds to make them more erect.

Black and Red Currants

The black currant fruits chiefly and produces the majority of its most luscious fruits on the growth made the previous season, whereas the red currant fruits on the two- and three-year-old wood and on spurs from older branches.

The pruning of black currants consists of removing branches which have fruited and leaving strong young wood for fruit production. The old wood should be cut back to strong, healthy young shoots, the nearer to ground level the better, as it is desirable to remove as much of the old wood as possible. Some bushes may produce new wood from the butts below ground and this may be retained for fruiting. Keep the bushes well spaced and open to prevent overcrowding. The plants should be kept sufficiently vigorous to produce ample strong new growth each season. It is of advantage to carry out the pruning immediately after the crop has been harvested.

The red currant requires different treatment from the black currant. It is pruned to form a bush of eight to 12 sturdy branches and the fruiting laterals and spurs are renewed every four to five years as the fruiting spurs begin to become sparse on any piece of older wood. The bush should be maintained in sufficiently vigorous condition to develop at least four or five new vigorous shoots annually.

Treatment of Tree Wounds

Tree wounds, whether caused accidentally or through the removal at pruning time of fairly large branches, must receive proper attention to prevent bacteria or the spores of fungi gaining entrance through exposed tissue.

After pruning, all cuts larger than $\frac{1}{2}$in. in diameter should have the edges carefully trimmed with a sharp knife (Fig. 41) and a tree-sealing compound, such as bituminous paint, applied over the cut. Tar should not be used. Fig. 42 shows a stub left through a cut being made at the wrong position; the cut should have been closer to the main branch as in Fig. 41.

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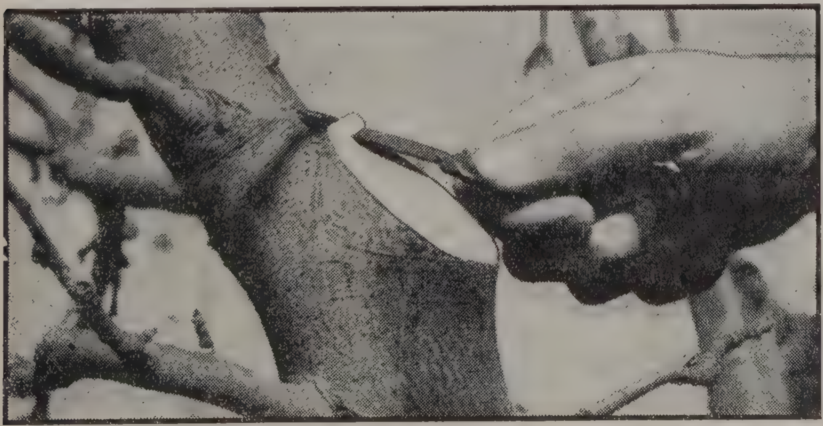

Fig. 41—A branch should be removed by cutting it close to the main branch and trimming the edges with a sharp knife.

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FARM MACHINERY REPAYS CARE

THE use of farm machinery has increased enormously in New Zealand over the last few years, as is illustrated by an increase of 9301 farm tractors since 1939, bringing the total in use in 1946 to 18,940. As machinery has assumed such an important place in farming operations, it is necessary to keep it operating at maximum efficiency, and in this article C. J. Crosbie, Assistant Machinery Officer, Christchurch, covers aspects of maintenance that arise in the periodical checking over of implements.

FARM machinery must be cared for intelligently and kept in good repair if it is to give efficient service. A big factor in the life of an implement is care, which must be given in the long idle period as well as in the working period. Too frequently a machine receives liberal douchings of oil while it is working, but it is left to the mercy of the weather for the rest of the year.

Very few implements actually wear out. Many of them have only a few actual wearing parts, which can be easily replaced, while only in a limited number are there so many wearing parts that it is cheaper to buy a new machine rather than replace worn sections of the original. Proper maintenance includes protection from the weather by housing, regular lubrication, adjustment and replacement of parts, and prevention of rust and deterioration by painting and periodical tune-ups. The manufacturer's operating manual should be referred to for the necessary data in phases of this work.

Housing Machinery

Most New Zealand farms have at least one shed devoted wholly or partly to housing farm machinery, and more expensive machines and those incorporating wood in their make-up will generally be found under cover, because the heavy average rainfall and long hours of sunshine that most districts of New Zealand enjoy are destructive to woodwork of machinery left in the open. However, as the rusting of iron implements is as costly as the rotting of wooden ones, it is just as important to house an iron plough as a wooden hay sweep. A machine that stands out in the open for 11 months is not likely to function well in the twelfth.

Some farmers use stray macrocarpa trees as cover, but this practice is not recommended. Also some farmers may be influenced by a report from America that lack of housing did not greatly reduce the life of an implement, but the States covered by the report have not the fairly-heavy, salt-charged winds that New Zealand experiences, and, further, repair costs of housed machines are lower.

Finally an implement shed should be used as such and not to shelter stray farm animals and fowls. Animal droppings contain nitrogen, and, in rotting, the nitrogen is formed into ammonia and then into nitric acid, which is the strongest acid known; examples of its intense corrosive action on steel and iron may be seen on any farm, and the point need not be stressed further.

Repairs and Adjustments

Not uncommonly implements are worked until they break down before they receive attention. In many cases breakdowns can be prevented by periodical inspections and by making any necessary adjustments; simple precautions such as running over a machine and tightening all bolts and set screws will save hours of delay which follow a breakdown.

It is all too common to leave an implement where it is after the job in hand is finished, whereas housing it and giving it the proper attention will ensure its being in good order and ready when next required. A simple precaution that is well repaid in reduced depreciation and easier operation of the implement when next used is to coat the bright parts such as the mower fingers with waste oil or grease. The results of neglect after use are readily seen in topdressers, drills, and spraying machines, which may become unworkable if corrosive chemicals are left in contact with the metal parts.

It is good practice to give machines a thorough overhaul during the winter when outside work is unpleasant. In this way worn and weak parts are located and either repaired or replaced so that when the busy season arrives the machinery is ready, and valuable time is not lost in making running repairs. Further, as the greatest demand on spare parts from machinery firms comes just before harvest, if repairs are put off till then, the part required may be temporarily out of stock. Also, the local blacksmith is inundated with requests to do repairs immediately before harvest, and often much of the work has to wait its turn before it can be completed. The wisdom of having this work done in the winter when the machines are not required and short delays do not matter is therefore apparent.

Running repairs and general overhauls are greatly facilitated by having a small workshop on the farm, and a number of farmers have made provision for this when erecting farm buildings. The workshop need not be pretentious, but should include a bench, a vice, and an efficient set of small tools. On larger farms it has been an advantage to include a forge and a few power-driven tools such as a grinder, bench drill, and buffing machine. A hoist or a pit is also a big help in major overhauls or repairs.

On some larger farms, now that most machines are mounted on pneumatic tyres, a small air compressor has been installed for pumping tyres. When the compressor plant is fitted with a spray-gun much time and labour may be saved in painting machinery and buildings. Compressed air may also be used with the forge,

Macrocarpa trees provide the only shelter for this tractor mower and tractor sweep since the last harvest.

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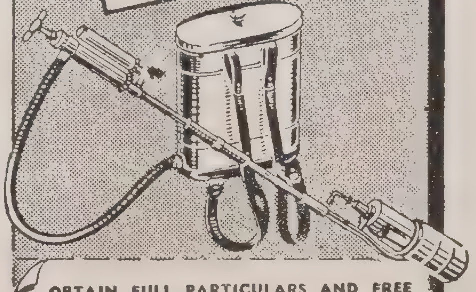

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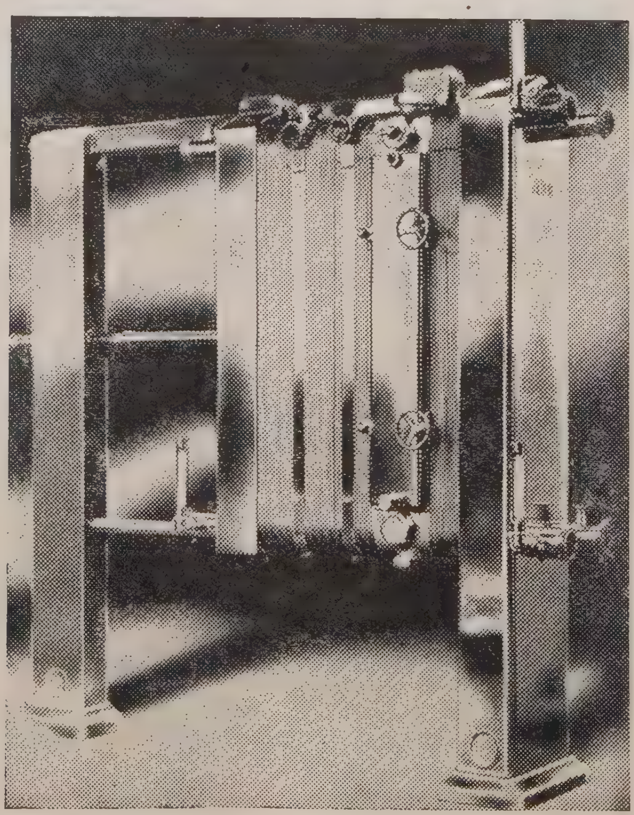

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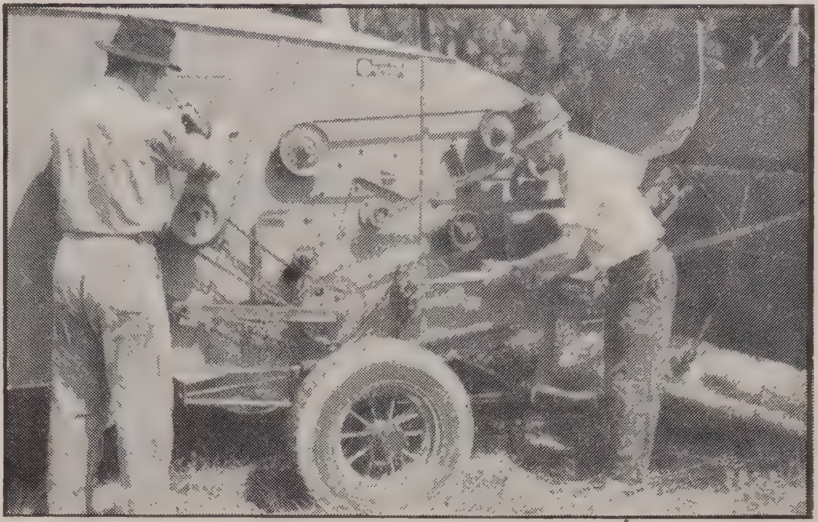

[*Public Works Department photo.*

Correct and regular lubrication is important in the maintenance of farm machinery.

greasing plant, and for cleaning parts under repair, but perhaps the greatest saving its use ensures is in tyre wear, for correct tyre pressures are important and are easily maintained with an air compressor.

Welding

Many blacksmiths and most motor mechanics now have in their shops either a gas or an electric welding plant or perhaps both, and most farmers use the services available when breakdowns occur or when overhauls are being carried out. Welding is used on farm machinery either to rebuild and to hard-surface worn parts or to join broken parts.

Most worn parts may be rebuilt by the welding process and finished with a metal that will wear well. Thus ploughshares may be reshaped and the leading edges toughened, axles and journals may be built up and either ground or turned to the correct size, while track pins, links and plates, sprockets and front idlers, mouldboards, cultivator tines, and potato-digger chains may also be given a second life by a competent welder.

New techniques and new welding rods have recently been developed that can be applied to farm machinery and should do much to increase the life of wearing parts.

When parts break during the harvest it is often quicker to have them repaired by the local welder rather than to send for a new part, as the saving in time may mean the difference between a crop in the bag or stack and one left out in the rain. Welded parts are often stronger than the original, but before replacing them it is wise to consider the cause of the breakage. If the part itself is at fault, it is generally safe to replace it, but if the adjustment of allied parts is faulty, this should be corrected before the part is replaced, otherwise the breakage is likely to recur.

Before a part is taken to be welded it should be thoroughly cleaned of grease, for grease and oxygen under pressure can cause an explosion. Rust and paint around the weld should be removed, otherwise they may enter the weld and weaken it. Such simple precautions save valuable time for both welder and farmer.

Painting

Farm implements are still being painted before being turned out from the factory, but because of the nature of their work, it is not long before they require another coat to prevent rusting. A good lead-base paint mixed with linseed oil is preferable to the varnish paint on new implements. It is not necessary in painting to make the machine look like new, but if it is painted regularly and housed well, it is afforded a valuable protection. A mixture of 4 parts of metallic zinc powder with 1 part of zinc oxide and linseed oil is a good rust-inhibiting paint that is being increasingly used on farm machinery in America. It is a grey paint that may be used both as a primer coat and as a finisher.

New wooden buildings, especially those built of undressed timber, absorb a great quantity of paint, which can make the job of painting them expensive. Initial coats of waste oil overcome this to a large extent, and if they are left for a short period, the final coat of regular paint will take satisfactorily. Alternatively, such buildings may be painted with a mixture of waste oil and red iron oxide to give a coating that is cheap, protective, and pleasing.

Spray painting is by far the best way to paint farm buildings and machinery, and small air compressors and spray-guns are now available for this work at a reasonable price. On straightforward work about 800 square feet an hour can be covered, with a consumption of 3 to 4 gallons of paint.

In painting, as the cost of labour frequently exceeds that of the paint, it is advisable to use a good grade of paint, whether for metal or wood. Repainting should be done before the existing coat fails completely, for over a period of years good paint applied frequently enough is cheapest.

Conclusion

As farming is becoming more and more mechanised, it behoves farmers to look after machines if the best is to be got from them. Machines in poor condition cannot be expected to work well and losses from this cause, especially at harvest time, may be serious. Farmers who rely on machines to cut production costs should have a systematic policy of care and maintenance. Better service from machines results from better maintenance.

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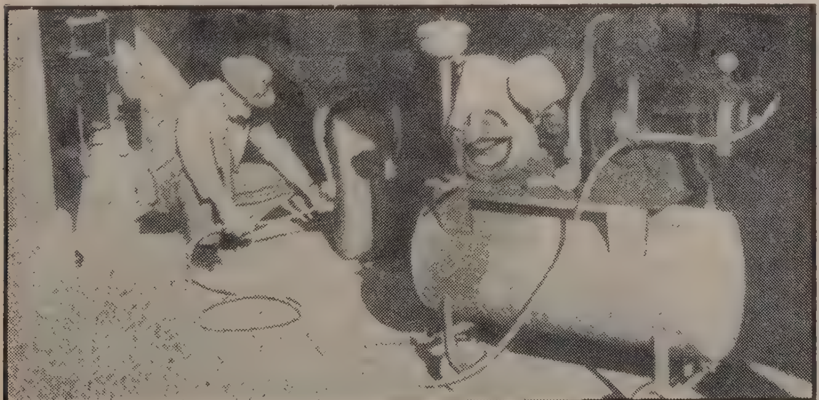

A small air compressor has many uses on larger farms, particularly where the machines are pneumatic-tyred.

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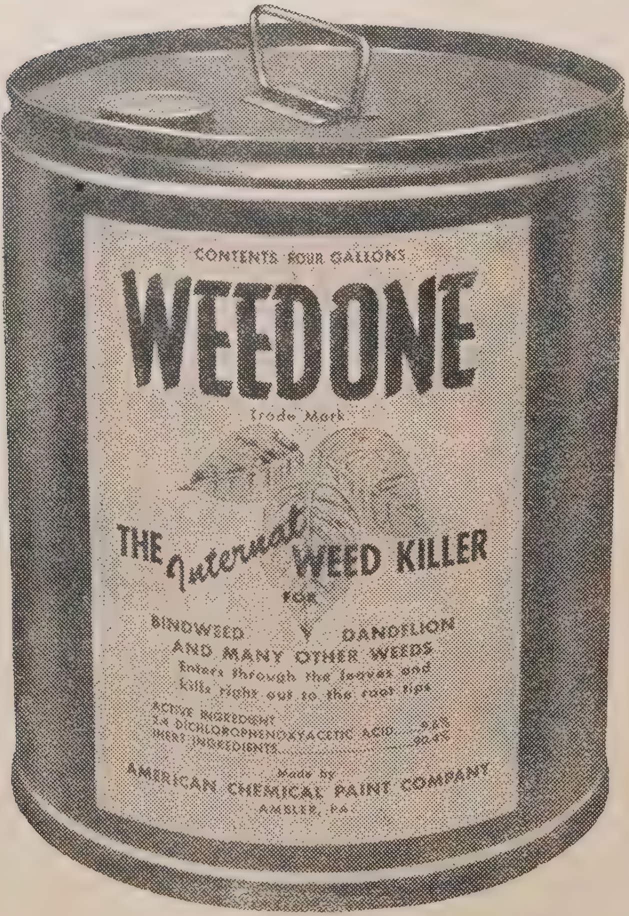
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THE HOME GARDEN IN AUGUST

By A. G. KENNELLY, *Instructor in Vegetable Culture, Christchurch.*

AS August is regarded by the average home gardener as the first month of the new gardening year, there is a tendency to sow immediately all types of hardy vegetables regardless of ground conditions. There should be no great urgency for extensive sowing of seed merely because the new gardening year has started. Sowing should be governed by the state of the ground and climatic conditions.

IT is not advisable to sow unless the soil can be worked down to a fine, friable tilth; soil is usually in the right condition if it does not stick to the soles of the boots when walked on. In the well-planned garden of adequate size a considerable area of ground should have been dug or trenched in the autumn or early winter and left rough, and the first thing to be done before sowing in spring is to fork over the top spit and break it down thoroughly. This forking provides a good opportunity for digging in lime or artificial fertiliser; the organic manures such as stable or farmyard manures are best deeply dug into the ground in the late autumn or early winter. Light soils require only a shallow forking, as they break down well and readily crumble to a fine tilth if they are in condition for sowing. Heavy soils are thoroughly loosened and aerated best by breaking the sods with the back of the fork, and the operator should work backward so that he does not walk on the loosened soil.

Firming

Firming requires a good deal of judgment. Soils that are heavy or only just dry enough require care to ensure they are not firmed too much; hitting the earth with the back of the spade is sometimes sufficient, but soil that is in the best condition for sowing should be firmed by walking over it with a shuffling motion. Merely walking across the plot is not advisable because usually the soil is then made too firm. It is important to remember that the object of firming is to pack, not consolidate, the soil particles.

Raking

The final work required to be done on the seed-bed is the removal of loose stones and rubbish and reducing the surface of the soil to the finest, level tilth possible. This is done with the fine-toothed garden rake, the teeth of which should penetrate only to the actual depth the seed is to be sown. Heavy soils must be closely observed and sowing delayed if the soil is at all sticky and the correct tilth cannot be easily obtained.

Seed Drills

Probably the most convenient tool for making the seed drills is the ordinary swan-necked hoe. In drawing a drill with the hoe the blade should be tilted on its edge and only the corner used. By using short, frequently-repeated strokes the drill can be drawn straighter and its depth more carefully regulated than if long continuous strokes are used. The maintenance of correct, even depth is very important because variations are likely to cause irregularity of germination which will result in difficulty of thinning or blank spaces in the rows.

Marking the Rows

There are various ways of marking the rows. Some home gardeners use on each end of their garden line a peg or stick about 2ft. long and marked at 6in. intervals. This method is quite good, but a 6 to 10ft. length of 1½in. x 1in. or 1¼in. x ¾in. batten marked at 6in. intervals and having each foot number painted will be found very useful both for marking off the distance between the rows and the distance between the plants in the row.

Seed Sowing

The depth of seed sowing usually shown on the seed packet is given more as a guide than a rigid direction. To germinate and grow, seed requires certain soil conditions—favourable temperature and the correct amounts of moisture and air content. Mechanically the soil must not be so loose that the radicle, or young root, finds itself in an air pocket on emergence, nor so compacted (nor the seed planted so deeply) that the young growing shoot cannot force its way to the surface of the ground. If seed is planted too shallow, the soil may dry out and the tender growth suffer injury or die off. Small seed requires only a shallow drill, and as long as a continued supply of moisture is ensured the covering need be only enough to hide the seed from view. Seed like beet and parsnip can be covered by about ½in. of soil, peas by about 2in., and large seed like beans by 2 to 3in. It is usually a good plan to make the drill a little deeper than required and not fill it completely. This serves to mark the seed drills and for such crops as peas and beans is more convenient for later earthing up.

Seed marketed by reputable seedsmen almost invariably has a high germinating capacity and should be

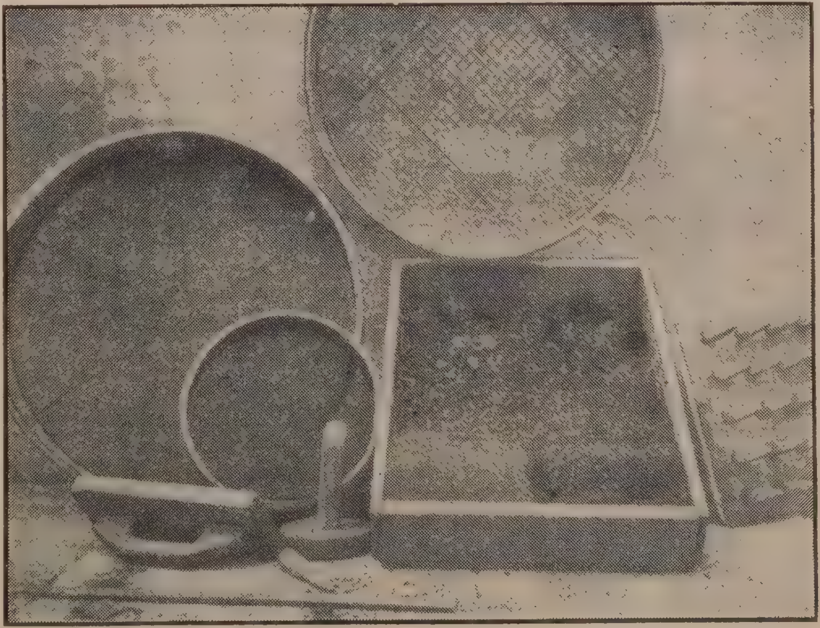

Fig. 1—In the preparation of a seed-box coarse soil is placed at the bottom of the box to permit drainage and finely-sieved soil is used at the top for seed sowing.

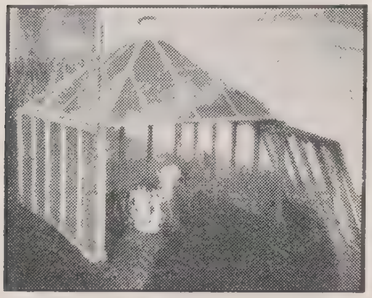

Fig. 2—An old type of cloche.

sown thinly. A still day should always be chosen for sowing, and usually the seed can be gently shaken into the drill from the seed packet. If this is difficult, seed can be emptied into a piece of stiff paper with a V-shaped fold which can be used as a scoop. The mixing of a little sand with certain types of fine seed is sometimes helpful, but too much sand should not be used because of its tendency to sink to the bottom of the mixture.

Garden Hygiene

The importance of hygiene in garden practice cannot be over-emphasised. It is applicable to almost every major garden operation, and includes the burning of such material as old partly-rotted string, sacking, and wood or prunings not suited to composting, spraying, the deep burying of soft garden trash bearing short-lived diseases, the ridging of soil to expose insect pests or their eggs to the weather or birds, the sterilisation of soil and seed boxes, fumigation of glasshouses, and the cleaning of tools, which may bear the spores of diseases.

Advantages of Cloches

Home gardeners who find the production of early and late vegetables a problem can overcome the difficulty by using a cloche. Cloches have been used for many years in both home and market garden production overseas, and the results indicate that they deserve wider use in New Zealand. Cloche is a French word meaning bell, which was the shape of the glass originally used by French market gardeners, but the cloches in use today are immeasurably superior. With the bell-shaped cloche there was no automatic ventilation, and cropping had to be planned to fit the circular jar. Modern cloches provide continuous protection of plants in the row and are therefore usually referred to as continuous cloches. There are two main types, the tent and the barn, each of which may be of different sizes.

The tent pattern consists of two sheets of glass held firmly in position by a block of wood or a simple but effective system of wiring (Figs. 4 and 5), and the barn type (Fig. 3) is made up of four sheets of glass held rigidly by wires. Cloches are simple to assemble or dismantle and the wire has the advantage of giving the minimum shade on the glass and allowing the cloches to be moved safely.

Though the cost of cloches, particularly the barn type, deters many gardeners from purchasing them, it should be borne in mind that the cloche is not limited in its use to one crop a year. A home gardener with a set of both the tent and barn types of cloche can put them to many uses. Using the medium-sized tent type, he can raise seedlings of all sorts in spring or grow early carrots, beetroot, lettuce, spinach, or even strawberries. With the barn type he can grow in addition to the crops mentioned French beans, dwarf peas, potatoes, early cauliflower, cabbage, and broad beans and also force rhubarb or asparagus. In summer he can use his tent type to grow carrots, beetroot, French beans, lettuce, and radish, and his barn type for cucumber, melons, marrows, and tomatoes. In autumn carrots, lettuce, onions, and spinach are suited to the tent type, and the barn type can be used for lettuce, onions, spinach, rhubarb, and French beans. The barn type is especially useful for ripening late-maturing dwarf tomatoes. In winter almost all hardy seed may be sown, provided the cloches are placed in position 10 to 14 days before sowing. Cloches can generally be used to start all crops and to mature most. Rows should run from north to south and cloches at the ends of rows should be fastened with pegs against wind. The cloches should be covered with straw or sacking if frosts are severe, and in winter the ends should be sealed with a piece of glass or flat wood. In summer the cloches should be separated by a gap of ½in. to give better ventilation.

Variety of Sizes

Cloches, or wire frames if the home gardener prefers to buy his own glass, are usually obtainable from most seedsmen or horticultural firms, but the supply fluctuates. The barn type of cloche varies in size from about 12in. high, 18in. wide, and 14in. long to about 2ft. high, 2ft. wide, and 20in. long, and the tent type from about 7in. x 18in. x 20in. to about 11in. x 18in. x 18in.

Cloches can be Home Made

For home gardeners who wish to make their own cloches there are numerous simple ideas for construction. Here are three methods of making cloches of the tent type.

Fig. 4 shows how a cloche can be held together by a piece of wood about 4in. long, 1in. wide, and 3in. deep. A saw cut equal to the thickness of the glass is made in each side of the block ¼in. from the bottom to a point 1¾in. from the top and ⅜in. from the side. On the angle of the saw cuts depends the slope of the glass forming the sides of the cloche, and any slope can be easily tested by being drawn on a sheet of paper.

The two cloches illustrated in Fig. 5 are self-explanatory and can be easily made by anyone handy with tools.

Jerusalem Artichokes

In gardens having sufficient space the Jerusalem artichoke is well worth growing. Like most vegetables, it responds well to good cultivation and manuring, but satisfactory crops may be grown with little attention on fertile soil. Its hardiness and freedom from disease or insect pests and the flavour and variety it adds to the menu make it worthy of more general cultivation. Tubers (either cut or whole) may be planted now 3 to 4in. deep and 15 to 18in. apart in rows 3ft. apart. The tubers keep quite well if they are left in the ground and may

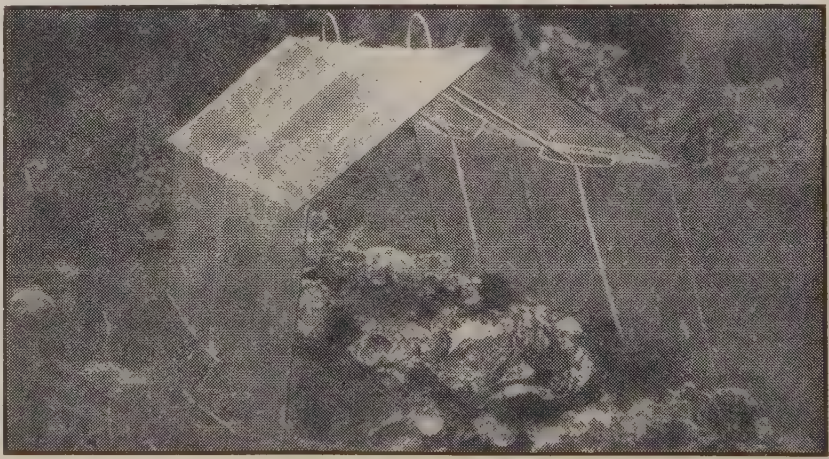

Fig. 3—The barn type of cloche.

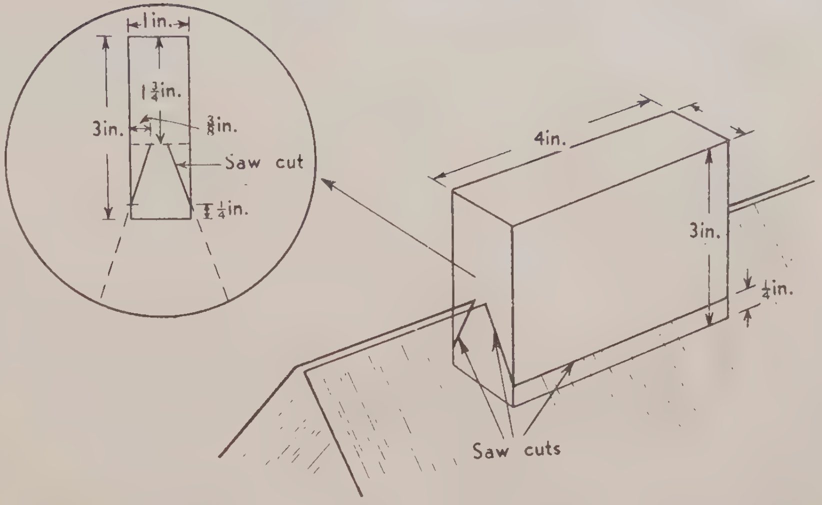

Fig. 4—A tent type of cloche which is held together by a block of wood.

be dug as required. Three pounds will plant 100ft. of row.

Asparagus

Though asparagus is not a high-yielding crop in comparison with cabbage, cauliflower, and carrots, it has a delicious flavour and is harvested at a time in spring when in most gardens vegetables are either scarce or lacking in variety. If bought, it is usually dear, and as relatively few gardens contain beds, it is usually prized as a luxury vegetable. The plant is a perennial and once properly established may be cut each spring for seven to eight consecutive weeks. The beds last up to 20 years, and if a new bed is planned, its site should be deeply dug and heavily manured with well-rotted stack bottom, stable or farmyard manure, or compost. All perennial weeds should be removed and, if necessary, the area drained by breaking the subsoil or in more extreme cases by installing field drains. Built-up or raised beds are an advantage where the surface soil is shallow or drainage is poor.

The addition of two handfuls of blood and bone plus a handful of superphosphate and another of muriate of potash well mixed and applied where each crown is to be planted will not only ensure a good start, but will provide supplies of plant food that will be available for a considerable time. A popular belief that the plant does best in sandy soil and requires salt is not borne out by the experience of commercial growers on a fairly wide range of soils. Well-drained, moderately-heavy but free-working loams have proved excellent. Salt is not essential in the soil, though the plant is tolerant of it.

One-year seedlings are usually preferred, as they transplant better and establish more readily than two-year crowns, which are considerably larger and therefore more subject to damage during transplanting. Set the crowns about 8in. below soil level, and spread the roots evenly by placing the base of each crown on a small heap of soil drawn up in the bottom of the trench. The top bud should not at first be covered by more than 2in. of soil, as the young plants are liable to be smothered and retarded if deeply covered before they have become established and are sufficiently strengthened. The crowns should be planted 18in. apart in either single or double rows, but the bed for a double row should not be less than 42in. wide. No spears should be taken from the first year's growth, but where 2-year-old crowns have been planted a light cutting for two weeks in the second year and three weeks in the third year is sufficient. Thereafter the normal cutting season should last for about seven to eight weeks.

Popular and well-tried varieties are Mary Washington, Martha Washington, and Connovers Colossal. A variety called Paradise—a more recent introduction—is rapidly becoming popular because of its quality of spear and general vigour.

Beetroot, Carrots, and Turnips

Early sowings of beetroot, carrots, and turnips may be made in most districts if the soil conditions are favourable. These vegetables do well in ground that was heavily manured for a previous crop. The rows should be 12 to 15in. apart and the seed ½in. deep. The turnip and beetroot should be thinned to 2 to 3in. apart in the rows, but the carrots may be left, except in heavy soil that is inclined to consolidate and so prevent development, and the thinnings used for soups and stews as soon as they are of suitable size. If the soil is lacking in fertilising elements, blood and bone mixed with twice its weight of superphosphate should be broadcast at the rate of 2 to 3oz. a square yard.

Broad Beans

A sowing of broad beans can still be made to provide supplies for summer. There is a risk of aphis attack and damage to flowers by bees in late sowing, but where there is a preference for this vegetable it is usually a risk worth taking. The aphis can be controlled by spraying with nicotine sulphate 1:800. Sow the beans 2 to 3in. deep and zig-zagged 4in. apart in double rows 3ft. apart. A quart of seed will sow about 100ft. of row.

Cauliflower and Cabbage

Sowings of cauliflower and cabbage made earlier in frames for successional transplanting should be given ample ventilation and at the first sign of mildew on the leaves they should be sprayed with Bordeaux 3-4-50. Seedlings of the quicker-maturing varieties of cauliflower such as Early London and All Seasons and of cabbage of the Golden Acre variety should be set out during the month if conditions are

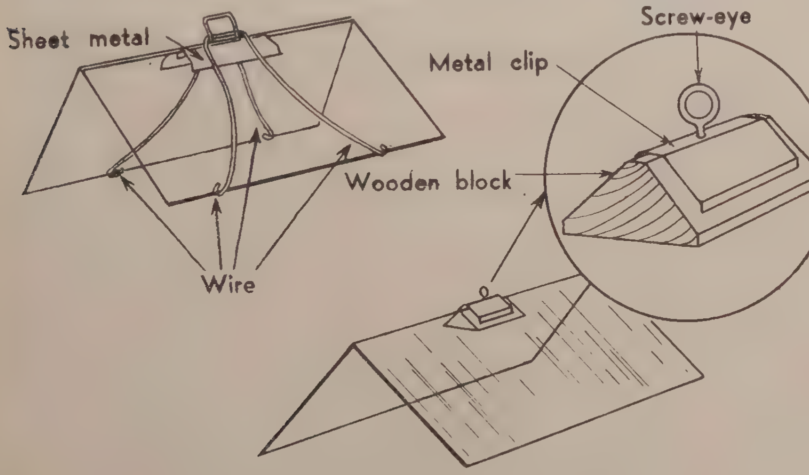

Fig. 5—Two easily-made cloches of the tent type.

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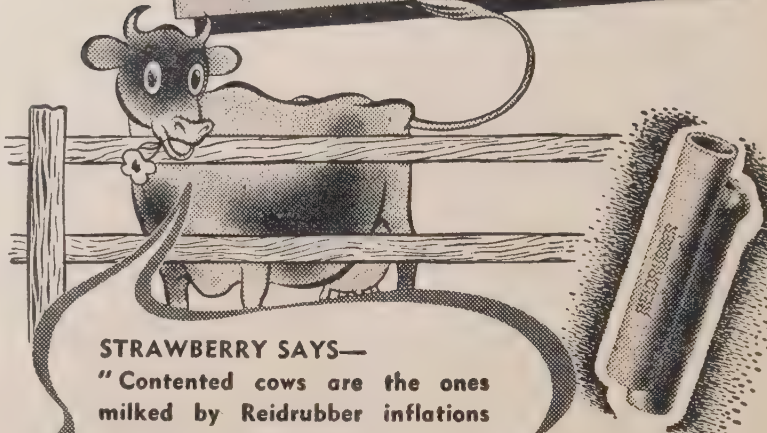

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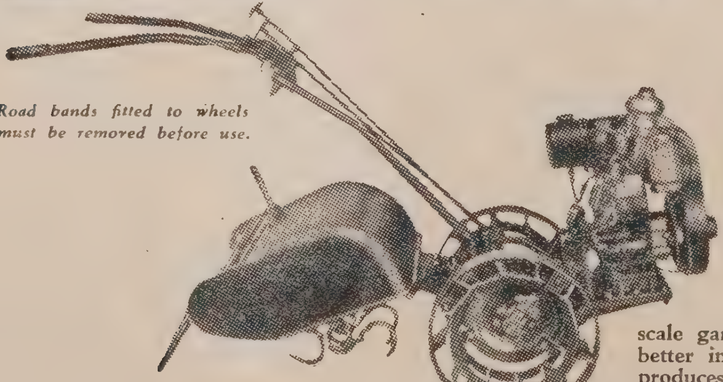

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favourable. If good plants are set out, they should provide heads for cutting from November to December. A further sowing of the varieties named above may now be made or succession may be arranged for by sowing varieties with different maturity periods, such as Golden Acre, Copenhagen Market, and Henderson's Succession cabbage and Early London, Phenomenal Five Months, and Phenomenal Main Crop cauliflower; all these varieties may be sown now or in a month's time.

The seed-bed for cabbage and cauliflower should be well drained and broken down to a very fine tilth. Sow ¼ to ½in. deep, preferably in a row or in rows, as seedlings in rows are not only easier to cultivate and keep free from weeds, but are usually easier to lift. The ground where they are to be planted out should be deeply cultivated and enriched with farmyard and stable manure, but where this is not available a mixture of 2 parts of blood and bone and 1 part of superphosphate applied at the rate of ¼lb. a square yard is a good substitute. It is necessary to differentiate between the manuring of the seed-bed and the land on which the crop is to mature. The latter can, with benefit, be greatly enriched with manure, but as germinating seed is liable to rot if it comes in contact with a considerable quantity of manure, the seed-bed should receive only enough manure (and that well incorporated throughout) to give the young seedlings a good start.

Standing Green Crops

Green crops should be frequently hoed to keep down weeds and to loosen the soil. This permits better aeration and drainage and thus improves soil temperatures and encourages root action. It is at this time of year that the advantage of liberal spacing is manifest, for it permits easy cultivation without either danger of injury to foliage or roots or overconsolidation of the soil.

Only the late-maturing varieties of Savoy cabbage, such as Omega and Latest of All, now remain in most districts and gardeners having them will appreciate the value of summer planning.

It is still possible in most gardens to have a few late brussels sprouts, and crops like broccoli, silver beet, and spinach should be available in every good-sized garden. Autumn-planted spring cabbage should now be developing well and in gardens that are not too exposed there should also be spring cauliflower to add variety to the succession. Spring cabbage, in particular, will benefit from the application of liquid manure. It is advisable to have organic liquid manure available for application to such crops, but sulphate of ammonia applied at the rate of 1oz. to 4 gallons of water is a good substitute. Broccoli plants should be watched for signs of approaching maturity, and if the curd is exposed, an inner leaf or two broken so as to cover it will give adequate protection from the light and frost and to some extent from the rain.

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Herbs

Herbs such as parsley, mint, sage, and thyme should have a place in every home garden. They are best planted close together in a place where they will be easily accessible to the housewife.

Parsley should be sown in the autumn and again in early spring each year, as it has only a limited life. The seeds are slow to germinate and it is often advisable to sow them ¼ to ½in. deep in a box and transplant them 6 to 9in. apart.

Mint is usually propagated by rooted cuttings of the creeping stems, and in gardens that are inclined to be dry it is a good plan to plant it under or near the water tap. Should the garden soil be naturally moist, mint sometimes has a tendency to invade ground intended for other crops. In such situations it must be cut back regularly with a spade and the unwanted roots forked out before they become too firmly established.

Sage and thyme may be grown from seed sown in September or October, but both are more often propagated vegetatively, thyme by division of the roots and sage by cuttings taken in the late spring or early summer. Established beds of both herbs are usually lifted and the old plants divided or renewed every three years. Sage should be planted 18in. apart in a warm, sandy soil, and thyme 1ft. apart.

Onions

In the North Island onion plants from autumn-sown seed can be set out on a prepared bed as advised in last month's "Journal." In the South Island it is customary to grow such onions without thinning for use in December or January. They should be kept cultivated and free from weeds. An early spring sowing can be made in most districts if ground conditions are favourable, but in the south the ground is not generally warm enough to sow the main crop until September. In preparation for this the ground should be thoroughly cultivated and a dressing of 2oz. of superphosphate plus 1oz. of muriate of potash and 3oz. of bonedust to the square yard should be broadcast over it. If convenient, the bonedust should be applied several weeks before planting or sowing. The onion repays good cultural methods, and organic manure such as farmyard or stable manure should be applied when the land is first dug in the autumn or early winter. The onion bed must be well drained and kept free from weeds. Potash manure is especially valuable and may be supplied by a heavy dressing of dry wood ash instead of muriate of potash.

Sow the seed ½in. deep in rows 12 to 15in. apart. "Transplants" may be set out in rows 12 to 15in. apart with about five plants to every foot of row. Pukekohe Longkeeper and Turbot are good-keeping varieties, and for more immediate use there are plenty of other good high-yielding varieties available, such as Ailsa Craig, Giant Rocca, and Brown Globe.

Parsnips

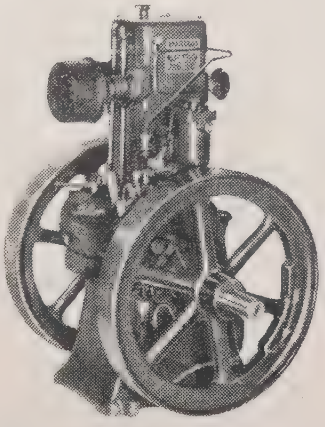
In home gardens a small early sowing of parsnips may now be made. Though the parsnip has a rather sweet flavour which is not as much in accord with modern tastes in vegetables as most other root crops, it is very useful for soups and stews. It requires a moderately-rich soil and does well in ground that was heavily manured for a previous crop. The tap root of most varieties penetrates deeply into the soil, and deep digging or trenching is therefore an advantage. Very early crops may be obtained by sowing a turnip-rooted variety which should mature in about 12 to 14 weeks. Most home gardeners, however, are content to grow parsnips only for late autumn or winter use, and they achieve this by sowing a variety such as Hollow Crown in October, November, or December.

Parsnips should be sown ¼ to ½in. deep in rows at least 15in. apart and require to be thinned 4 to 8in. apart as soon as the seedlings are well established.

Peas

Provided conditions are favourable, an early sowing of peas may now be made in most districts. Before sowing, the peas should be dressed with a suitable seed protector as advised in last month's "Journal." To maintain a succession of crops varieties of similar maturity periods should be sown at regular fortnightly or monthly intervals, or alternatively several varieties such as Massey, Onward, and Stratagem, which mature in that order, may be sown at the same time.

FROM WAR TO PEACE . . .



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THE HOME GARDEN IN AUGUST . . .

When sowing make a shallow trench and press the seed into the bottom of it; in the heavier soils the seed should be put about 1in. deep and in light soils up to 2in. deep. Seed can be sown in zig-zag fashion 2 to 3in. apart in rows 20 to 36in. apart. One pound of seed is sufficient to sow up to 100ft. of row. A dressing of superphosphate at the rate of 1 to 2oz. a square yard applied before sowing will be found to give satisfactory results.

Potatoes

It is advisable in most districts to refrain from planting any considerable area of potatoes until September and in many districts it is better to wait until October. In the meantime potatoes can be sorted over and set in boxes in a light, airy, frost-free shed or outhouse to green and sprout. The potato requires a well-drained soil containing plenty of humus; in soils deficient in humus scab is liable to be troublesome. Sets (either cut or whole) should be planted 3 to 4in. deep and 14 to 16in. apart in rows 24 to 27in. apart. To plant 100ft. of row 16 to 20lb. of potatoes are required.

Probably the most favoured early variety is Epicure, but Doon Early is gaining considerable popularity. In the South Island Arran Banner, which is actually a second early, is often planted as a first early because of a popular belief that it recovers well if it is frosted.

Rhubarb

If the work of planting new rhubarb beds or renovating old ones has not yet been commenced, it should be proceeded with at once. Each succeeding year after the third or fourth the growth of crowns that have not been disturbed becomes weaker. Too many buds develop and from each many weak stalks arise. Old crowns should be lifted and reduced in size by chopping with a sharp spade or similar implement as soon as the buds are clearly discernible.

When healthy, vigorous crowns commence to grow the buds show up as they emerge from their protective covering as blunt protrusions with a fleshy-pink colouring. Replant crowns with only one or two buds in ground that has been deeply dug and heavily manured with humus-forming material such as farmyard or stable manure or old stack bottom. A handful of blood and bone should be mixed with the soil about each crown if other organic manure is lacking.

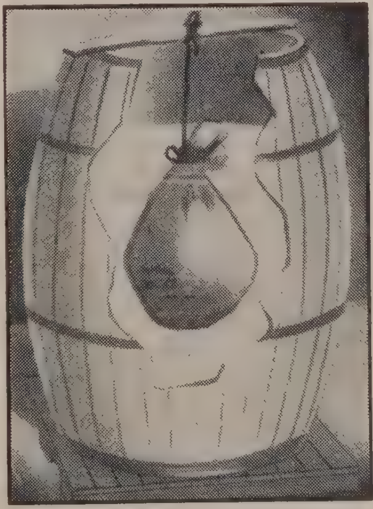
The site of new beds should be deeply dug or trenched and enriched with organic manure. Perennial weeds such as couch grass or convolvulus should be removed, and if necessary the area should be drained by field pipes or by the deep burial of open, stony material to form a moraine drain. No stalks should be pulled from newly-planted crowns the first year, and only light pullings should be made the second season. Thereafter if the plants are well manured each year, the pulling of main crop rhubarb should last for about two months each spring. Perpetual or ever-bearing rhubarb is usually pulled in the autumn or winter, and if space permits, it is as well to have a few crowns in the garden to extend the period rhubarb is available. The pulling of stalks is exhausting to the crowns and they must have an adequate period of rest each year.

Retarding Second Growth

Toward the end of August, or even earlier in the warmer localities, root crops such as carrots and parsnips begin to make second growth. Usually this is only top growth, and as it is the first stage of seed production, it is produced at the expense of the tap root. Lift the roots as soon as growth commences, and store them in a cool cellar or outhouse. They should be used without undue delay, as they deteriorate rapidly unless kept at nearly-freezing temperatures.

Salad Vegetables

Salad vegetables such as lettuce, radish, and spring onions can be sown now if ground conditions are favourable. Small successional sowings are in order, as these vegetables remain in best condition for only a limited time and should be used when young and fresh. They are a useful source of vitamins and are worthy of more general use in New Zealand.



[*Sparrow Industrial Pictures Ltd. photo.*

Fig. 6—Method of making liquid manure in a large container.

Shallots

August is the best month for setting out shallots. The bulbs should be graded, and those of moderate size set out 8in. apart in rows 12in. apart. Press them firmly in the soil just deep enough to give them stability to enable roots to develop. Cultural requirements are similar to those for the onion.

Spinach and Silver Beet

Spinach and silver beet are relatively quick-maturing vegetables and are among the first of the new season's crops to mature. They do well in the cool soils of early spring as long as there is sufficient lime present. If lime is lacking, it should be dug in at the rate of 2 to 3oz. a square yard. A fertiliser made up by weight of 3 parts of superphosphate and 1 part of sulphate of ammonia, and applied at the rate of 2 to 3oz. a square yard will provide the stimulus so necessary for the production of the crisp, succulent growth desirable in these vegetables. Liquid manure may be given later. If organic material for making it is lacking, 1oz. of sulphate of ammonia to 4 gallons of water may be used. Silver beet transplants well at this time of year and is usually spaced in rows 18in. apart. Thin or plant out to about 8in. apart in the rows. Seed of both spinach and silver beet should be sown ½ to 1in. deep. Spinach should be sown in rows at least 12in. apart and thinned to 3 to 6in.

Liquid Manure

A good-sized container such as a 40-gallon drum or large open cask filled with liquid manure is an advantage in the home garden (Fig. 6). Liquid manure is one of the most valuable of plant foods and is quite easily made. A small sack or sugar bag should be filled with fresh manure (preferably pig, cow, sheep, or poultry manure) and submerged for a week in a large container of water. The solution should be used at the rate of 1 part to 3 parts of water. If the container is then refilled with fresh water, the solution may be used at the end of a week, diluted with equal parts of water. Thereafter each refilling should be allowed to stand for about a week, and the liquid used neat. This manure should be applied weekly at the rate of 4 gallons to about 18ft. of row. It is safe to use and is a complete plant food. Gardens where organic manure is in short supply will especially benefit from its use and such crops as cabbage, cauliflower, lettuce, silver beet, and spinach show a gratifying response to its application. Dry soil should be watered before liquid manure is applied. The sugar bag containing the manure should be pressed from time to time to ensure more complete dilution of organic material in the water.

FARM WORK FOR AUGUST

By the Fields Division

FEED PROGRAMME

FEED for stock on many farms is at its lowest in August, when spring grass growth has not started and reserves of silage, hay, roots, and greenfeed may be nearly exhausted. While it is not possible to make any immediate provision against shortage, its occurrence may serve to point to the need for providing more adequate feed supplies in the future.

Plans should be made now to guard against possible shortage next summer, autumn, and winter. Grass paddocks may be selected for ploughing up for crop or even for resowing to grass. Paddocks to choose are those which have deteriorated from attack by grass-grub or porina, those damaged by feeding out during wet conditions, and those in which the sward has deteriorated because of of age, the use of inferior seeds, or overstocking.

CROPS TO GROW

The variety of spring-sown crops for supplementary feed is wide and the choice depends mainly on the soil, the time for which provision is planned, and the type of stock to which the crop will be fed. For winter feed for dairy cows and sheep, chou moellier, mangolds, carrots, sugar beet, and swedes are all valuable, heavy-producing crops on medium to heavy land. On warmer, fertile areas pumpkins, kumi-kumis, and maize may be grown, and on lighter land thousand-headed kale may be preferred to chou moellier. For early- or late-autumn feed other crops may be considered, such as soft turnips, rape for lamb fattening, and bitter blue and sweet blue lupins, while in warmer districts Japanese millet may be favoured. Spring sowings of Italian or short-rotation ryegrass can give very useful greenfeed for summer, autumn, and winter.

Crops for pigs may give a valuable monetary return in supplementing meals and in tiding over the winter period when the skim-milk available is limited. Very useful crops for pigs are barley, peas, and maize for grain, and carrots, pumpkins, sugar beet, and artichokes for roots.

CEREALS

Preparations for spring-sown cereal crops should be made as weather and soil permit. Sowings of spring wheat should be made in August and September wherever conditions allow, with slightly heavier seedings than for autumn-sown wheat, 2 to 2½ bushels being usual. Most of the main varieties except Hunters and Dreadnought are suitable for spring sowing. Tainui, Marquis, and Jumbuck are all varieties particularly good for spring sowing on suitable land.

Autumn-sown wheat crops may be fed off on areas where there would otherwise be a danger of rank growth and subsequent lodging. For best results feeding off should be carried out quickly with a large mob of sheep, and should be followed by tine harrowing. Rolling and harrowing of other autumn-sown wheat crops may be carried out later in August or in September, according to weather and crop conditions.

As barley matures more rapidly than wheat, it may be sown later with success. If conditions are right, sowings can be started in August, continuing through to October. Preparations for spring-sown oat crops may also be made in the same period. Crops of autumn-sown oats for greenfeed should be shut up if they are to produce crops.

POTATOES

Main-crop potatoes still in the ground should be dug as the weather allows, and frost damage avoided by proper protection of the dug tubers.

Attention should now be given to pre-cultivation work before sowing the main crop in October, as thorough cultivation for potatoes is well repaid.

Areas from which potatoes have been removed should be prepared for the following crop; peas, spring cereals, or supplementary feed crops such as rape are suitable for this purpose.

In buying seed potatoes the grower should first select varieties that have been found most suited to the locality. It is always advisable to purchase Certified seed whether for table or seed potatoes. Where it is not intended to produce seed for sale Certified commercial seed may prove more suitable. If the crop is to be entered for Certification, however, the grower must of course buy seed of Certified Mother origin.

GRASSLAND WORK

Pastures may be harrowed to spread cow manure when the soil is dry enough before the hot weather starts. Rolling of paddocks where hay, silage, and roots have been fed out during the winter months may be beneficial on some areas.

Areas which could not be topdressed or limed in the autumn could profitably be treated now if supplies are available; hay paddocks in particular could receive dressings at this stage. The use of sulphate of ammonia on pastures to be saved for grass seed or on unthrifty swards may also be an advantage.

GRAZING MANAGEMENT

Grazing management of especially-valuable pastures requires care and consideration at present. Young permanent pastures can easily be damaged by injudicious stocking. Cattle may "poach" the ground when it is wet, which leads to the establishment of weeds such as buttercups and thistles. Sheep may be more safely used to graze wet land. Damage may also be caused by overstocking, particularly with sheep, or by undergrazing. Overstocking at this time may result in deterioration of young pastures to such an extent, particularly by encouraging flat weeds, that the sward may never fully recover. On the other hand undergrazing may cause smothering of clovers, because of the shading and weakening effect of coarser grasses. The main point, therefore, is to manage the grazing of young pastures with care and judgment.

GENERAL FARM WORK

In this issue is an article dealing with the care and maintenance of farm machinery, and before the busiest part of the farm year begins attention should be paid to this work. Other jobs which may require to be done at present are fencing and building repairs, weed grubbing and cutting of secondary growth, extension of farm drainage and cleaning out of old drains, improvement of farm gates, and cleaning up of wool sheds. Frequently these jobs are neglected, partly perhaps because of more urgent work, but on some farms because of lack of planning, and forgetfulness. The result is that when the busiest season comes the work either has to be left altogether or done at the last minute, perhaps delaying more important operations.

Before pasture growth becomes too tall hay paddocks should be looked over for odds and ends of equipment that might damage the mower. Stacks of baling wire and even harrows are not uncommonly seen lying about at this time.

Preventable Farm Wastages In Spring - calving Cows

By A. D. M. G. LAING,
Veterinarian, Hastings.

A WEAKNESS in the animal husbandry on New Zealand dairy farms is a tendency to consider the dairy cow merely as a milk-producing machine, but dairy herds which are most free from disease and unnecessary wastage are those in which the individual "mak-ups" of the cows are carefully studied and allowed for. True animal husbandry constitutes the handling and feeding of domestic animals to make them as efficient as possible in the purpose for which they are bred and to maintain them at a high level of efficiency for as long as possible.

[*Green and Hahn Ltd. photo.*

The provision of hay and good winter pasture will assure cows coming in in the spring fit and well for a heavy season's milk production.

THE modern dairy cow is a highly-bred, highly-strung animal, with in most cases quite strongly-developed physical and mental characteristics. Certain cows, for instance, are particularly liable to milk fever if they "come in" during the spring flush of grass. Suitable treatment will do much to prevent this. Certain cows, too, are temperamental in various ways, and, if suitably treated, will yield better.

Dairy farming can be a weary drudgery, or it can be very hard but intensely interesting work, the difference lying very largely in taking a real individual interest in one's cows.

Principal Causes of Loss

Apart from tuberculosis and abortion, the principal causes of loss in New Zealand dairy herds are milk fever, grass staggers, paralysis after calving, temporary sterility (inability of cow to conceive), mastitis, and bloat, the symptoms of which are generally well known to dairy farmers. Causes and suitable first-aid treatments until veterinary advice and services are available are dealt with in this article.

If a high-producing dairy cow in the prime of her life, calving during the spring flush, is fed solely on the spring flush of pasture, with its high protein content, she will come into maximum production so quickly that her system may have great difficulty in adjusting itself to the new conditions. The sudden production of a large quantity of milk involves a greater strain on the digestive organs owing to the larger quantity of food which has to be taken and its high protein content, and a particularly high strain because of the richness of the food on certain of the organs such as the liver and kidneys. If these do not function satisfactorily, impurities enter the blood, and there is possibility of paralysis after calving; the condtion may even cause liability to mastitis.

["*N.Z. Dairy Exporter*" *photo.*

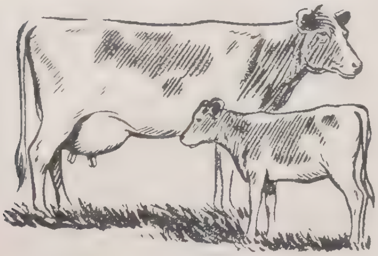
First-class, mature dairy pasture is an essential component of the milk cow's ration, particularly just after she comes in.

Milk, which is prepared direct from the blood by the minute glands lining the tubes and ramifications in the udder, contains about 12 times the proportion of calcium in the blood. The percentage of calcium in the blood has to be kept level within very narrow limits. If it gets too low, milk fever symptoms occur; if too high, other serious symptoms occur.

If the control mechanism in the cow's body which keeps the level of calcium in the blood within the correct limits is suddenly called upon to adjust itself to the removal of comparatively large quantities of calcium in the milk, as when the cow is brought too rapidly into full production, it may have difficulty in functioning satisfactorily, and milk fever occurs.

Similar factors involving the maladjustment of minerals in the blood occur in grass staggers.

The milk-producing organ is one part of the general reproductive sys-



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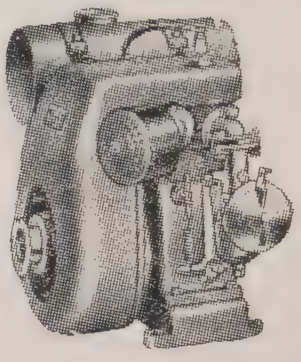

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Why and When to change inflations

Recent research by the New Zealand Department of Agriculture has proved that milking inflations should be changed regularly.

It has been found that slack inflations tend to slow up milking, and slow milking tends to cause "strippy" cows and lower production. Old inflations harbour bacteria and, when slack, could result in increased mastitis. Dirty inflations cause second-grade milk.

The Department recommends that inflations be changed every six weeks if milking up to 15 cows per set per milking; more frequently if more cows are milked.

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tem. To what extent the different functions of that system are separate from one another has not yet been decided by research workers. It is, however, possible that the sudden and excessive strain of high milk production may have something to do with failure to conceive.

Prevention of Springtime Losses

Milk fever, grass staggers, paralysis after calving, temporary sterility, mastitis, and bloat undoubtedly cause substantial annual losses. It is contended that suitable animal husbandry methods will go far toward prevention, as the principal causes are unsuitable feeding practices and unnecessary and thoughtless rigidity in handling and working cows. Preventive measures must be adapted to the weaknesses and idiosyncracies of individual cows. Not only will such individual attention pay good dividends to the dairy farmer, but it will also add interest to the job.

Preventive measures may be on the following lines:—

The cow must be in good condition when calving, and must be fed as far as possible on mature grass and hay or silage.

When the cow has calved and has commenced milk production she must not be forced. The spring flush must be supplemented at first by hay and mature pasture. Maximum production must be allowed to come on gradually, so that the cow's system has time to adjust itself to the demands of milk production. Supplementing hay with molasses is sound policy for newly-calved cows.

Certain cows are more liable to milk fever and bloat than others, and it is advisable to manage a cow known to be liable to milk fever with greater care. An adequate intake of green-feed will ensure the supply of mineral matter, whereas if such a cow is being maintained on hay, a bone-meal lick might be required to supplement the rather low mineral content of hay.

Another precaution is not to milk out the udder at each milking for the first few days after calving. This tends to prevent the sudden withdrawal of large amounts of calcium from the system and gives time for the animal to adjust its milk production according to the reserves of calcium in its system.

All milk cows should be trained to submit to handling and holding, at least by the owner, so that any necessary drenching or treatment can be carried out with a minimum of fuss.

To produce milk a newly-calved dairy cow has to increase considerably her intake of nourishing pasture at quite short notice. In the spring on typical dairy land her feed will be largely of a high protein content, throwing a great strain on the digestive system. It is of the utmost importance, therefore, that changes in quality and type of feed should be gradual and spread over some days.

A typical milk fever case, the cow being in a comatose condition. This can and does happen as a result of "forcing" milk production too rapidly. The cow has been given first-aid treatment by inflating the udder with air. The tapes tying up the teats must be removed within 20 minutes of the udder being inflated.

There is an old farmers' saying, "The master's eye makes the cattle fat," which is an allusion to the supreme importance of attention to the individual well-being of stock. Details of causes and first-aid treatment of diseases which are responsible for preventable losses in dairy herds follow.

It is important for a farmer to realise that the earlier a veterinarian's assistance is called to treat disease the more effective the treatment is likely to be.

Milk Fever

Symptoms of milk fever are loss of control of limbs, collapse, loss of consciousness, and death.

Too low a proportion of calcium in the blood, which is the immediate cause of the disease, may be remedied by inflation of the udder to prevent the milk formation which is removing the calcium from the blood. The teats must first be carefully cleansed with methylated spirits and the teat tube sterilised by boiling.

Another well-known method of treatment of affected animals consists of hypodermic injections of calcium borogluconate solution of recognised dosage. The preventive measures already described should assist in reducing the number of animals which will require to be treated.

Grass Staggers

Symptoms of grass staggers are excitement, nervousness, convulsions, collapse, and death, which may be very sudden. Unconsciousness, which is a sympton in milk fever, does not occur in grass staggers.

The immediate cause of grass staggers is probably an upset in the proportions of magnesium and calcium in the blood.

An effective remedial treatment is the immediate injection of 2oz. of Epsom-salt dissolved in 10oz. of boiling water and cooled to blood heat before use. It may also be advisable to inflate the udder in many of these cases.

If cows show abnormal nervousness and excitement, the general preventive measures described earlier should be adopted immediately.

Both milk fever and grass staggers may occur weeks or months after calving if, after warm rains following a drought, a flush of feed results in a sudden increase in milk production.

Paralysis After Calving

Paralysis after calving is characterised by inability to rise, some dopiness, and perhaps lack of appetite. The dung is frequently hard, with traces of white mucus.

A general digestive upset and the presence of poisonous waste food products in the blood may render a cow liable to the disease, which is commonly, though not invariably, a sequel to milk fever, grass staggers, or calving difficulties.

Paralysis may be treated by giving a laxative drench of a mixture of from

2 to 4lb. of molasses in a quart of warm water. To stimulate bowel action further to remove waste products, the laxative should be followed by stimulant medicine. A powder composed of 1 dram of nux vomica and 3 drams of ammonium carbonate is shaken up in a pint of water and given as a drench night and morning. The affected animal should be kept warm and dry, well bedded down, given a laxative diet of greenfeed, be regularly watered, and changed from side to side to prevent sores.

Preventive measures are the same as for milk fever.

Temporary Sterility

Cows suffering from temporary sterility return repeatedly to the bull, but before concluding that this complaint is prevalent in the herd it is advisable to make sure that the trouble is not due to sterility of the bull. A laboratory test of the bull's semen should be obtained if there is any possibility of a new bull being required, but if more than a few cows are holding, it may be assumed that the bull is all right. The failure of cows to hold may also be due to septic inflammation of the passage leading to the womb, which is indicated by numbers of very small abscesses in the passage. These can be treated effectively with antiseptic solutions, but veterinary advice is essential.

If cows hold to the bull for 2 to 3 months and then return, and particularly if whitish discharges or foeti 2 to 3in. long are observed, a disease known as *Trichomoniasis* may be the cause. This is a serious condition, and veterinary advice should be sought at once.

The commonest cause of temporary sterility in dairy cows, however, is nutritional, and the general lines of prevention and treatment suggested earlier in this article should be followed. Except for treatment of septic inflammation of the passage, irrigation of the vaginal passage of the cow is useless. Except for a short period after calving liquids poured into the vaginal passage cannot enter the womb unless special instruments are used, and in any case they would not be effective and might do much harm.

Mastitis

Symptoms of mastitis are abnormal milk and heat, pain, and swelling in the udder. If the trouble is acute, the cow's whole system may become affected and the animal may die.

The immediate cause is injury to or weakness in the udder, which allows the entry of germs.

The "sulpha" drugs give good results in the treatment of mastitis, but veterinary advice should be obtained.

First aid should consist of hot fomentations to the udder, constant stripping of the affected quarter or quarters, and massage of the affected quarters with camphorated oil. If the udder is very hot and swollen, it should be suspended in a clean cloth with holes cut for the teats, the corners of the cloth being attached to cords tied over the cow's back. A drench of 10 to 12oz. of Epsom-salt and 1oz. of ginger in ½ gallon of water may be given if there is much inflammation, but not if veterinary advice indicates that "sulpha" drugs should be used.

As the disease may be carried rapidly from cow to cow by milking machine cups or milker's hands, affected cows should be milked last and teat-cups and hands washed in standard strength solutions of chlorine antiseptic. Mastitis milk should be rendered harmless by the addition of strong antiseptic before being thrown away.

To prevent the introduction of mastitis into their herds farmers buying stock should inspect possible purchases thoroughly for evidence of the disease, and should avoid animals with blind teats or weak quarters.

Correct use of milking machines according to makers' instructions and the Department of Agriculture's Bulletin No. 207, "The Care of Milking Machines," will minimise the possibility of injury to udders and teats. Vacuum pressures should be low and the teat-cups removed immediately the milk flow stops. Cows may be milked in groups with pressures adjusted to give the best results from each group.

Milking cows, particularly when their udders are full, should never move out of a slow walk. The dragging of udders in deep mud is likely to cause injury and contamination which are conducive to mastitis.

All cows should be dehorned to prevent injury due to fighting.

Cows should be trained to be handled and led by a halter, so that when they have to be examined or treated for an ailment struggling or the use of force is avoided.

Special precautions against mastitis are necessary if cowpox breaks out, and veterinary advice should be sought. Any other breaks or sores on the teats should be treated daily with a suitable antiseptic ointment.

Milking times must be absolutely regular if strain on the udder during long intervals between milking is to be avoided.

Teats should be carefully dried after milking and the milking parts of the cow properly cleansed before milking.

Teat dilators and milk siphons should never be used, as their insertion by unskilled operators could easily cause injury leading to mastitis.

Bloat

Bloat or tympany is caused by the formation of large quantities of gas in a cow's paunch, resulting in great distension, acute discomfort, difficulty in breathing, and death. It is possible that in some cases the poison of the gases and not the pressure they exert is the cause of death.

Immediate treatment is essential. A short thick piece of stick tied across the mouth like a bit or a dab of Stockholm tar on the back of the tongue is an old but quite effective remedy if the cow is only mildly blown. A dose of 2oz. turpentine shaken up in a bottle of milk is good treatment. A stick tied like a bit in the mouth and a long milking rubber well lubricated with raw linseed or olive oil passed very gently down the gullet may give relief. Another treatment is to knead or massage the left side of the belly upward with closed fists for 10 to 30 minutes.

After immediate treatment of a cow which has become blown a purgative drench of 10 to 12oz. of Epsom-salt and 1oz. of ginger in ½ gallon of water should be given.

The operation known as "tapping" is a last resort in the treatment of bloat. A trocar and canula are necessary for making the entry to the cow's stomach midway between the last rib and the hook bone and a hand's breadth out from the outer part of the backbone. Owners of properties on which bloat is common should keep these instruments handy during flush growth periods. The equipment should be sterilised by boiling before and after operations.

Bloat occurs generally when hungry cows are given free run on young soft grass and clover, and the trouble appears to be more prevalent on certain clovers and soil types. When the night paddock becomes bare and cows are turned out hungry after the morning milking bloat risks increase.

Prevention should therefore consist of feeding out hay before putting hungry cows on to young grass, and the grazing of mature pasture before young grass so that excessive quantities of young, lush feed are not eaten. Changes in feeding, too, should be spread over several days.

A cow which bloats frequently when other cows in the herd on similar feed are unaffected may have tubercular glands which swell and press on the gullet, partially closing it. If such a condition is suspected, it would be wise to have a veterinarian make a tuberculin test.

Effect of Stock Foods Act on Poultry Producers

THE Stock Foods Act, 1946, which places certain obligations on sellers of stock foods, came into operation on June 1. As the Act is of importance to the poultry industry, the main provisions of it which affect poultry producers are outlined in this article by F. C. Bobby, Superintendent of Poultry Husbandry, Wellington, who deals with the responsibilities of buyer and seller and the part taken by the Department of Agriculture in the operation of the Act.

THE Act offers protection to a poultry producer who in normal times can purchase any of the foods commonly used on a poultry farm by requiring that certain information be supplied to him regarding the food or foods purchased. From this information he can form an opinion of the food offered for sale, and judge its monetary value by comparison with the nutritional and monetary values of other foods. Previously a producer might be sold foods which were incorrectly named or labelled, or purchase a food such as a fish oil for its vitamin content, when, in fact, those vitamins were absent or in insufficient quantity to be of value. No check was made upon the quality of the foods sold, and little in the way of redress was possible. The buyer had to rely on the seller and this was not always satisfactory.

When stock food is purchased the seller is now required to supply the following information on an invoice or a label (part may be on the invoice and the remainder on the label):

1. The seller's name and address;
2. The name of the food sold;
3. The number of packages sold;
4. The gross weight;
5. The name of each ingredient, if the food is a mixture; and
6. Certain particulars regarding the chemical composition, except in the case of a grain or a mixture of grains.

Moreover, if the food purchased contains more than one ingredient, and can be said to have been manufactured, each package supplied must have marked on it, or on a label attached to it, the name and address of the manufacturer. Thus, if A manufactures a poultry mash, and B sells it (after purchase from A) to a poultry producer, each bag will carry the name of A and also of B, but the latter's name may be on an invoice only.

Items 1, 3, and 4 are straightforward, but the remaining items require explanation.

Name of the Food

The name of the food will be straightforward in the vast majority of cases, but for meat meal the Act gives the producer additional protection. If the meat meal contains not less than 60 per cent. of protein, it may be labelled meat meal, but if it does not contain that percentage of protein, it must be labelled meat-and-bone meal, thus preventing low-grade meals of this type being sold as meat meal. A tolerance of error of 3 per cent. is allowed in meat meals; thus, if challenged, a vendor selling a meat meal which shows on analysis to have only 57 per cent. protein would have no case proved against him.

The Act further protects a poultry producer purchasing either pollard or bran by making it necessary for the manufacturer to name the grain or seed from which the pollard or bran is made, for example, wheaten pollard, oaten pollard, or linseed bran. No other food ingredients may be added to a pure food such as bran, pollard, or ground oats without this fact being stated, because when another food or adulterant is added the food becomes a mixture, and each ingredient must be named.

Mixed Foods

If stock foods are mixtures or contain more than one ingredient, the name of each ingredient must be stated. Many poultry producers desired that not only should this information be given, but also the percentage of each ingredient. The Act does not require the percentage to be given, mainly because no check could be made if doubt was cast upon the accuracy of information supplied by the manufacturer. No form of chemical analysis will directly disclose whether a mixture contains wheat, oats, barley, pollard, bran, etc., quite apart from the percentage in which these are present. A close inspection, particularly with a magnifying glass or microscope, will reveal most of the ingredients in a mixture of meals, but not the percentage in which they are present. It is quite obvious, for example, that it would be impossible to separate pollard from bran in a mixture containing these two meals. The poultry producer is now informed of the names of all the ingredients included and can avoid in normal times mixtures with which he does not agree, or he can add a favoured ingredient which is not included in a bought mixture.

Chemical Composition

The requirement that particulars of the chemical composition of a stock food be supplied to a buyer is perhaps the most important item. As the particulars of the chemical composition vary with the class of food bought, it is necessary to deal with each class separately.

Grains

No particulars regarding the chemical composition of grains will be supplied. The poultry producer can judge by sight the quality of any grain or the grains in a mixture. He knows by experience the relative feeding value of common grains such as wheat, oats, barley, and maize. The Act does, however, define "cracked grains" such as cracked or kibbled maize. The pieces of grain must not be able to pass through a metal sieve with round holes having a diameter of 1/16in. This places a check on the inclusion of any appreciable quantity of unwanted dust, particularly in chick feeds.

Brans and Pollards

The maximum percentage of fibre must be stated in brans and pollards. This is limited information, but the buyer may assess the value of wheaten bran or pollard by sight and touch. Obviously, poorer samples will contain comparatively high percentages of fibre, and these will have to be shown. Thus, the lower the maximum percentage the higher is the quality of the food.

Meat Meal or Meat-and-bone Meal

Only meals containing 60 per cent. of protein (after allowing the 3 per cent. tolerance provided by the Act) may be labelled meat meal, and those of a lower protein content must in future carry the name of meat-and-bone meal. Manufacturers must also state:—

(i) **The minimum percentage of protein in the meal.** The buyer is thus advised of the minimum amount of the nutritional ingredient for which the meal is bought. This should assist poultry producers where they wish, or are forced, to purchase the lower-grade meat-and-bone meals in which the protein content can be low for poultry feeding.

(ii) **The maximum percentage of fat.** Poultry do not require appreciable quantities of fats or oils, and, in fact, may easily suffer digestive troubles if these are present. Thus, meat meals or meat-and-bone meals should be low in fat when required for poultry feeding. Poultry producers will accordingly select wherever possible grades of these meals which state a low fat content.

(iii) **The maximum percentage of ash.** Meals containing appreciable quantities of bone will show a heavy ash content, whereas high-grade meat meals will give a correspondingly low figure for ash (or mineral) content.

Feeding Oils

The Act gives poultry producers necessary protection when buying feeding oils, as no one is able by observation to judge the vitamin content of a feeding oil, which is purchased for poultry feeding entirely for its quality as a vitamin-rich food. The Act provides that the manufacturer of a feeding oil must state:—

(i) **The minimum number of international units of vitamin A in the oil.** Poultry producers should look for oils containing between 800 and 1000 units of vitamin A. Although not the most important vitamin for which oils are usually purchased for poultry feeding, vitamin A has a real value for poultry in assisting to build up health and resistance to disease. A lack of vitamin A may even result in a nutritional disease known as nutritional roup.

(ii) **The minimum number of "chick units" of vitamin D in the oil.** Poultry producers are urged to note carefully that feeding oils suitable for poultry must be marked in "chick units." Briefly, the reason for this is that certain forms of synthetic vitamin D are entirely satisfactory for feeding to animals, but are only partially satisfactory when fed to birds. The distinction has therefore been made as an added protection to poultry producers. Vitamin D is given to poultry, more particularly to young chicks, as a protection against the occurrence of rickets. It is most important that chicks should have this protection, and as these oils are comparatively expensive, it is equally important that the amount of vitamin D present should be sufficient to give protection. Poultry producers are recommended to purchase oils which are stated to have a minimum of 100 "chick units" of vitamin D.

Fish Meal

Although fish meal is not yet in common use, the Act requires a manufacturer to state:—

(i) **Minimum percentage of protein.**

(ii) **Maximum percentage of fat.** The fat requirements of poultry have been dealt with in the section on meat meal.

(iii) **Maximum percentage of common salt. This is an added protection because poultry have a limited tolerance** in the consumption of common salt.

Poultry Mashes

The Act requires the manufacturers of mixtures of meals, normally referred to as poultry mashes, to state the name of each ingredient included in any mixture. In addition, the following particulars of the chemical composition are required:—

(i) **Minimum percentage of total or crude protein.** In bulletins published by the Department of Agriculture or in books dealing with the theory of feeding and nutrition of poultry it is customary to refer to "digestible protein" or "digestible fat." This means the quantity of any of these chemical constituents which are likely to be digested or made use of by poultry. These quantities have been calculated as the result of carefully-conducted nutritional experiments. On the other hand an analytical chemist when analysing a food ascertains the total protein, or crude protein as it is termed, present in that food. There are therefore two sets of figures available—those for crude protein and those for digestible protein. The Act refers to crude protein or crude fat for each class of food. Poultry producers will therefore find that an average poultry laying mash containing, say, 10 per cent. of meat meal (protein content 60 per cent.) will show a crude protein content of about 16 to 17 per cent., but this expressed in digestible protein would be about 14 to 15 per cent. Producers should also note carefully that the Act requires the minimum percentage of crude protein in the mash to be stated, not the actual quantity present. Thus, a manufacturer may state "15 per cent. crude protein," knowing that he is endeavouring to maintain between 16 and 17 per cent., as in the case of an average sample of standard mash.

(ii) **Maximum crude fat.**

(iii) **Maximum crude fibre.** The percentages of crude fat and crude fibre should be as low as possible. It is probable that in the present standard laying mashes these will be about 4 to 5 per cent. for fat and 6 to 7 per cent. for fibre. In normal times, when full use can be made of first-quality foods suitable to poultry, both these figures could be reduced.

(iv) **Maximum percentage of common salt.** The amount of salt shown for poultry mashes will be about 1 per cent., and should not exceed 1½ to 2 per cent. at any time.

(v) **The percentage of every added mineral if it is present in excess of 2 per cent.** This gives poultry producers protection against the inclusion of amounts of minerals in excess of what is either necessary or desirable.

Operation of Act

Regulations which are likely to be brought down to operate the Act are unlikely to be of direct interest to poultry producers, as they will deal largely at this stage with the methods laid down for analysing samples taken and the precise method by which samples shall be taken. Poultry producers will, however, be interested in how the Act is operated, and the procedure briefly is as follows:—

A buyer of a stock food may request an inspector (Inspector of Stock), in writing, to take a sample of a food should the buyer consider that this food is materially at variance with the particulars given on the invoice or label supplied. A fee, as yet to be fixed, will be payable before the inspector takes his sample, and, in addition, the latter must give the seller from whom the food was purchased four days' notice so that the firm involved may have a representative present, if desired, when the sample is taken. The inspector must then satisfy himself that the food has been properly stored and has not been tampered with. This means that the sample will be taken from packages (sacks, bags, etc.) which have not been opened after purchase. The sample is then taken, and a proportion of it sent to an analyst, who sends his findings to the Department of Agriculture and a copy to the buyer. If the analyst's certificate shows that the sample was not materially different from the details given on the invoice or label, the seller may claim reasonable expenses from the buyer if he has travelled to the buyer's farm to be present at the time of the sampling. However, if the sample proves to be materially different from the information stated on the invoice or label, the Act provides that action may be taken against the seller by the Department, and the purchaser will also be in a position to take civil action against the seller. It is obvious that early action should be taken if a buyer intends to request a sample to be taken.

It should be carefully noted that poultry producers cannot just send a sample of any food about which they may have a doubt to the Department and expect the Department to take direct action. There is a definite and necessary procedure, although the Department can take steps to check from time to time stock foods offered for sale, quite apart from any specific action which may be taken by a producer.

POULTRY FEEDING

Containing valuable information for all interested in egg production, Bulletin 198, "The Theory and Practice of Poultry Feeding," is available at 6d. a copy (post free) from any office of the Department of Agriculture.

Linseed a Valuable Crop in South Island Rotations

By E. G. SMITH, *Fields Instructor, Rangiora.*

WITH an assured market at a fixed price, linseed is a crop worthy of consideration on many South Island mixed farms. Although this season some autumn sowing has been carried out, linseed has always been looked on, as it is in this article, as a spring-sown crop. However, there is no reason why autumn sowing should not prove quite satisfactory under suitable conditions.

GIVEN warm weather and a reasonable supply of moisture, the crop is quick to establish and makes rapid growth. Dry weather is desirable as the crop nears maturity to condition the seed and facilitate harvesting.

Linseed has been grown in the past principally on the downs of Canterbury, and while it is satisfactory on a wide range of soil types, it usually does best on land with a clay subsoil.

Place in Rotation

The old belief that linseed would not give its best yields unless grown on land out of browntop has not proved to be correct. Generally highest yields are obtained on land out of good pasture. However, the crop can be grown successfully practically anywhere in the rotation, if the soil fertility is sufficiently high and the land reasonably free of weed seeds. Wheat is the most popular crop to follow linseed. Sowing a grass-seed mixture with the crop is now common, and while it is not suggested that this is the best method of establishing pasture, at least it is cheap, and some excellent pastures have been established in this way.

Cultivation

Cultivation methods vary with the conditions. If the land is skimmed out of grass during the autumn or the hustler used, and a well-rotted turf is ploughed down during the winter, an excellent seed-bed can be produced by subsequent cultivation.

Whatever method is adopted the resulting seed-bed must be fine, well consolidated, and free from weeds. To obtain this condition at minimum cultivation costs early ploughing is advisable, as it gives time for the weather to play its part in mellowing and consolidating the soil.

Whether the crop is sown on one furrow or the paddock skimmed or hustled before deep ploughing, care is needed to see that the land is worked to the bottom of the furrow, otherwise the moisture-holding capacity is reduced and the crop is severely checked during a dry period.

Although the roller compacts the surface soil only, it is advisable to sow on a rolled surface to obtain an even depth of seed at drilling.

Varieties

Bison has been the variety most widely grown in recent years and has given satisfactory results. For the past two seasons the Department of Agriculture has carried out variety trials and in these Golden Viking, Walsh, and Rio have shown promise, and seed stocks of these varieties are being multiplied for commercial use.

If labour is not available for stooking, linseed may be windrowed and later picked up with the header.

Sowing and Manuring

Linseed should be sown as soon as the soil is sufficiently warm to give quick establishment. In Canterbury an early October sowing is usually most suitable. Under favourable conditions late-sown crops may give payable yields, but in seasons such as the one just past harvesting difficulties are likely to arise.

A seeding rate of between 30 and 40lb. an acre is recommended, although in the larger-seeded varieties this should be increased. It is advisable to drill on a rolled surface through every coulter of the grain drill. Set the coulters right back and if possible use well-worn coulter tips. The seed should be planted not more than 1in. deep. Neither cross drilling nor the broadcast method has proved as reliable as drilling one way.

Superphosphate or serpentine superphosphate at 1cwt. an acre assists in quick establishment and root development of the crop.

Light harrows should follow the drill to give an even cover of seed. Except on light stony land, rolling after drilling is not recommended.

As linseed thrives on a semi-acid soil, a heavy application of lime just before sowing is not desirable. If, however, lime has been applied to pasture some time before ploughing, no ill effects will result.

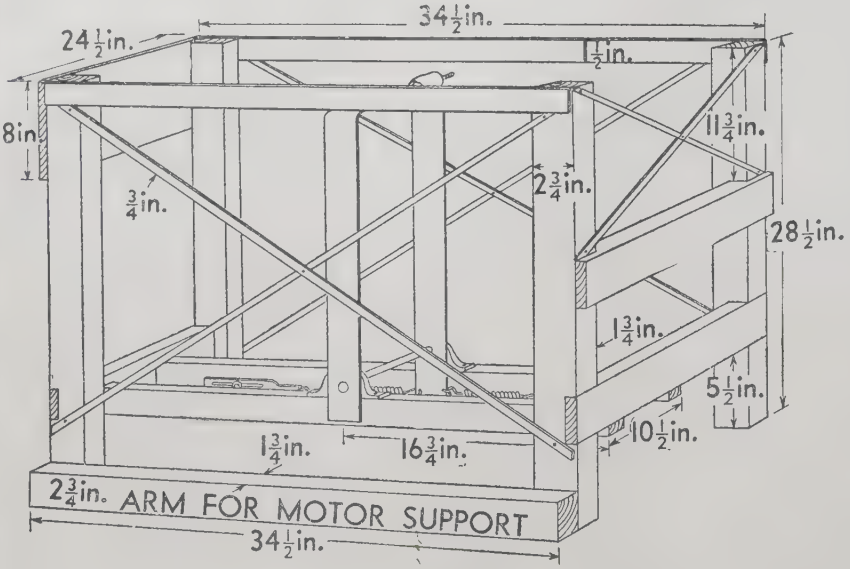
Normally harrowing is not necessary after the crop is established. If, however, heavy rain crusts the surface after sowing, a light tine harrow with well-sharpened points may be employed. Such harrowing should be carried out at a reasonably-slow pace, advisably in the direction of the drill.

Harvesting and Yield

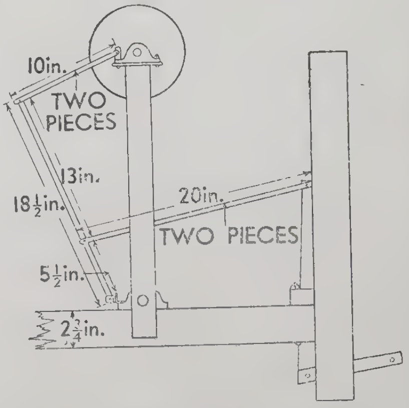
If linseed is sown in October, it will normally be ready for harvest in late February or in March. Under favourable soil and climatic conditions direct heading can be quite satisfactory, but if ripening is not even, reaping and threshing out of stook or stack is probably most reliable. The seed finishes well in the stook and can be stacked some days before it is ready to thresh.

If labour is not available for stooking, linseed may be windrowed and later picked up with the header. When this practice is adopted it is advisable to cut with the binder rather than the mower. Although cutting with a high stubble increases wind risk, it has the advantage of helping to condition the seed. Yields vary considerably, half a ton an acre being considered a fair average.

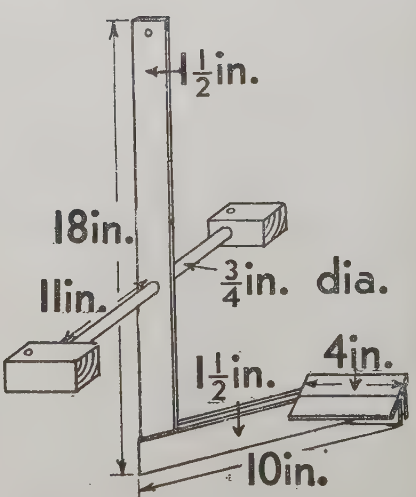
CONSTRUCTIONAL DETAILS OF APIARIST'S SAW BENCH


34½in.
24½in.
1½in.
8in.
11¾in.
2¾in.
¾in.
28½in.
1¾in.
5½in.
10½in.
1¾in.
16¾in.
2¾in. ARM FOR MOTOR SUPPORT
34½in.

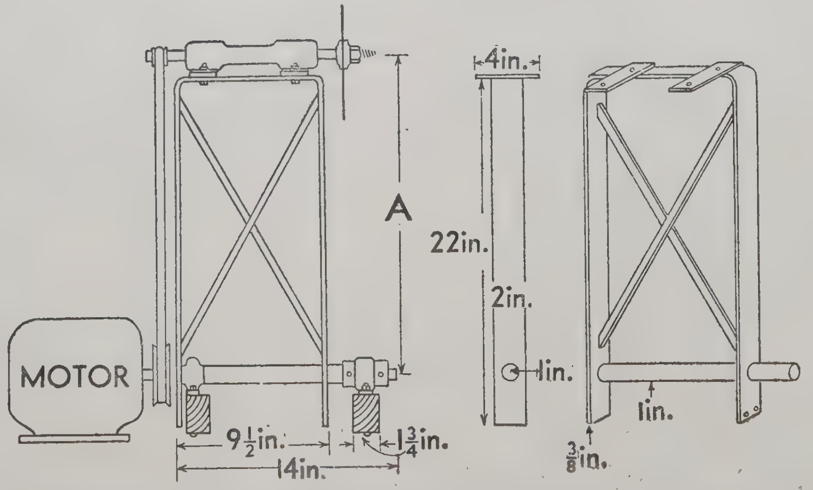
Frame assembly of saw bench.


10in.
TWO PIECES
13in.
18½in.
20in.
TWO PIECES
5½in.
2¾in.

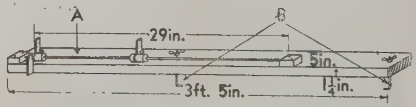
Rocker arm with levers and foot control.


1½in.
18in.
¾in. dia.
11in.
1½in.
4in.
10in.

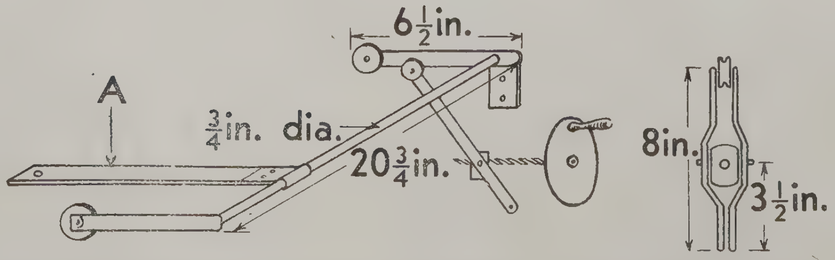
Foot control assembly.


A
MOTOR
9½in.
1¾in.
14in.
4in.
22in.
2in.
1in.
1in.
⅜in.

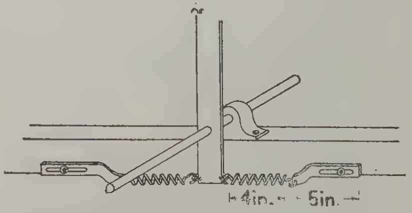
Saw spindle and rocker arm assembly. The distance between centres of saw spindle and rocker spindle (A) is governed by the size of pulleys and V belts used.


A
B
29in.
5in.
3ft. 5in.
1¼in.

Cross-cutting assembly with sliding adjustments. A—½in. steel rod. B—L bolts for clamping to bench top.


6½in.
A
¾in. dia.
20¾in.
8in.
3½in.

Method of raising bench. A—Lever for clamping rocker arm in vertical position.



Compensating springs with sliding adjustments. Diameter of springs 1in.

Saw Bench for Making Hive Parts

By C. R. PATERSON, *Apiary Instructor, Hamilton.*

THE making of hive equipment by beekeepers requires a suitable saw bench to handle the timber, knowledge in the working and care of such a machine, and the ability to make equipment to standard measurements. To help those beekeepers desirous of making their apiary requirements accurately with the minimum amount of machinery, the writer has built the combined saw bench illustrated, which is capable of dealing with all sizes and lengths of timber used. Several beekeepers who are already using this type of saw bench find it satisfactory.

BEEKEEPERS wishing to make up their own hive equipment frequently found that to make a satisfactory job a special saw bench was required for handling long lengths of timber, while another one was necessary to finish off the work. These machines are very costly, and as they are used for only a short period of the year, some beekeepers compromise by rigging up various attachments so that one saw bench will do all the work required. In these circumstances experience has shown in most cases that poor workmanship results. Others use the expedient of cutting up a long piece of timber into shorter pieces which are more easily managed when being sawn into the sizes required for beekeepers' equipment, but this means extra work and a waste of valuable timber. It is practically impossible to get an accurate cut when moving a long piece of timber over a saw. An exactly square cut is essential to enable a hive super to be nailed correctly and sit firmly in position on the hive.

Combined Bench

It may not be possible at present to procure all the items required to construct the bench described, and it may be necessary to use some alternatives.

The main features of this saw bench are:—

1. Ability to saw off the required pieces of timber accurately while the long lengths are stationary on the bench top.
2. The roller stand makes it possible for one person to operate the bench.
3. The specially-constructed cutting-off assembly enables three lengths to be permanently gauged—lengths for sides and ends of supers and lengths for top bars of frames, using ⅞in.

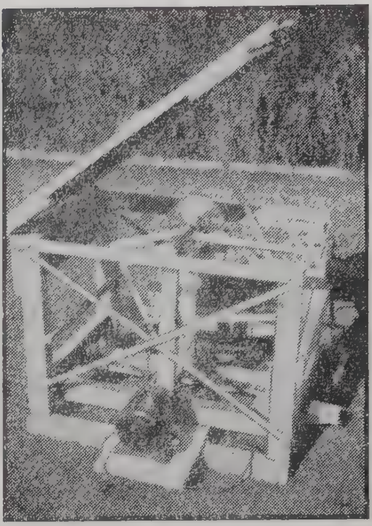


Fig. 1—Saw bench raised, showing the saw fixed in position for general use.

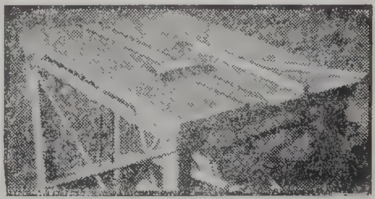


Fig. 2—Bench top showing ripping fence and cross-cutting slide.

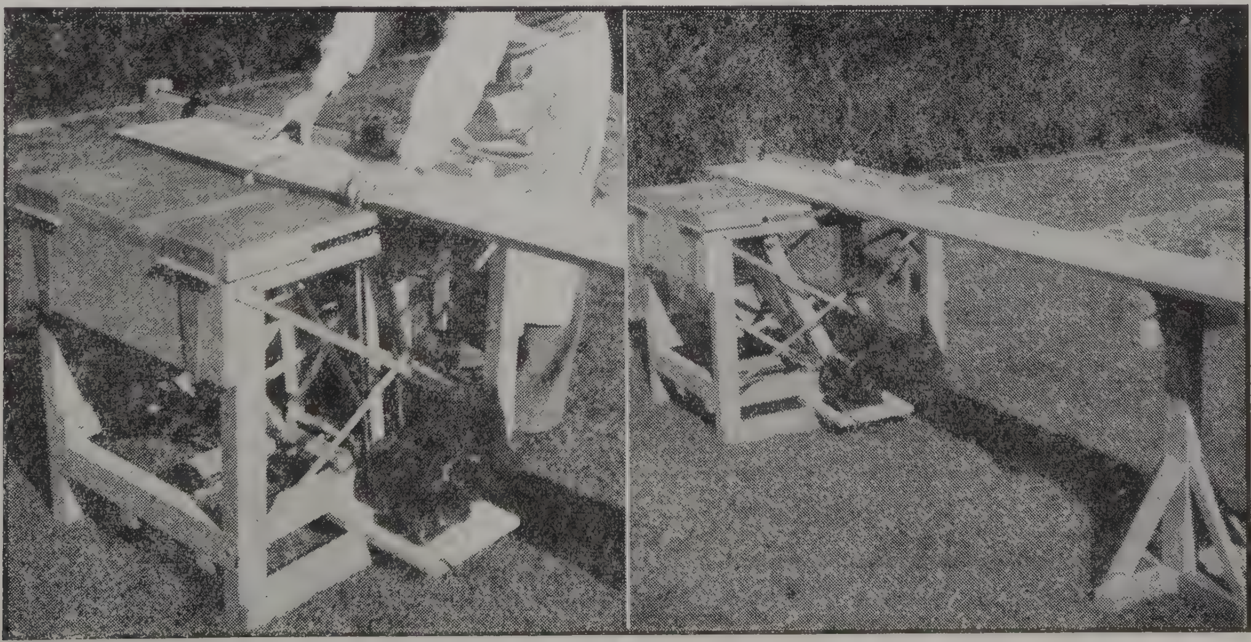
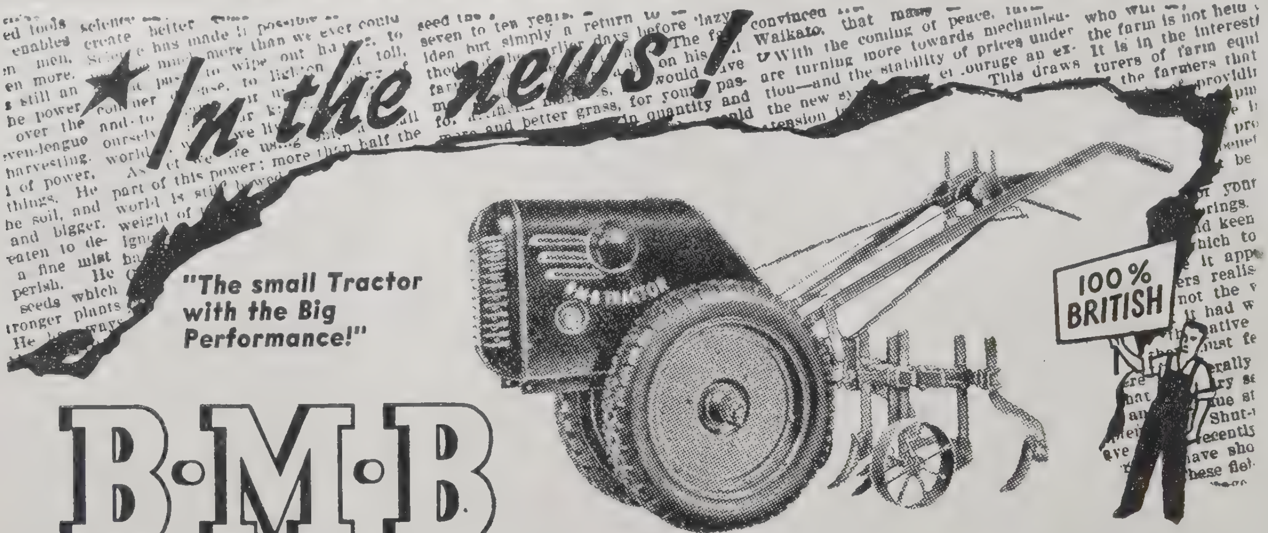


Fig. 3 (left)—Pressure on the foot pedal causes the saw to come up from below the bench top and cut into the wood. Fig. 4 (right)—Length of timber in place on saw bench and resting on roller-top stand.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timber. The use of these gauges enables the timber to be cross cut to give clean lengths for top bars, while small knots can be worked into the centres of other lengths for supers. In this way timber can be cut up with little waste, while at all times the gauges are constantly set, giving accurate measurements.

4. When the long lengths of timber have been dealt with the swing saw arm is made perfectly rigid by a clamping bar and the bench then becomes suitable for carrying out all the other different kinds of cuts necessary to complete the supers and frames.

The bench is constructed to deal with the different sizes of timber used by beekeepers. With an 8in. saw boards up to 11in. x ⅞in. can be cut, while 2in. is the maximum thickness that can be cut at any time.

Saw Spindle

The saw spindle is of the totally-encased type, with ball bearings and ⅝in. diameter shaft. The spindle should have well over an inch of spare thread beyond the fastening nut to allow the use of a "drunken saw" or a combination set or dado head. These are used for making the handle grips in the supers and grooving the sides for the reversible type of floor-board.

The power unit should not be less than ½ h.p. and double V belts would be an advantage over the single belt shown in the illustration.

The motor must be set so that the centre of its spindle corresponds with the centre of the rocker arm shaft. Belt adjustment can be made by placing liners between rocker arm and saw spindle assembly. The pedal control allows the free use of both hands in working the bench. A suitable lever operated by hand could be used if desired.

Supers or Hive Bodies

A factory-made dovetailed super is illustrated in Fig. 5. The interlocking nature of the dovetail makes a very strongly-constructed super, but the manufacture of this type is beyond the scope of the average beekeeper's plant. The half-check cornered type illustrated can be made on the average saw bench, and, if accurately cut, will give very satisfactory service for many years.

Hive Covers

Soundly-constructed hive covers are essential for the comfort of the bee colony. Many years of experimenting have shown that most suitable material for weather-proofing a lid is either galvanised iron or bituminous roofing. Other materials such as painted fabrics give very unreliable service. With the present high cost of materials it is advisable that every part of the lid be constructed properly, to give as long

MAKING HIVE PARTS

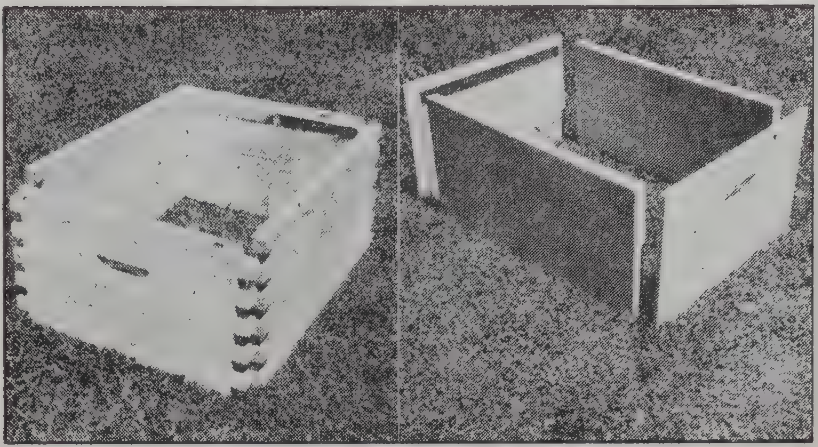

Fig. 5 (left)—Dovetailed super. Fig. 6 (right)—Half-checked super.

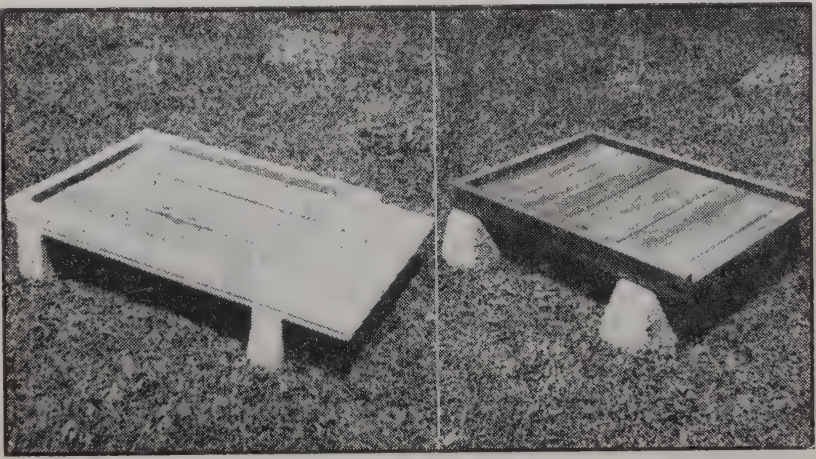

Fig. 7 (left)—Popular type of floor-board. Fig. 8 (right)—Reversible type floor-board used with concrete blocks.

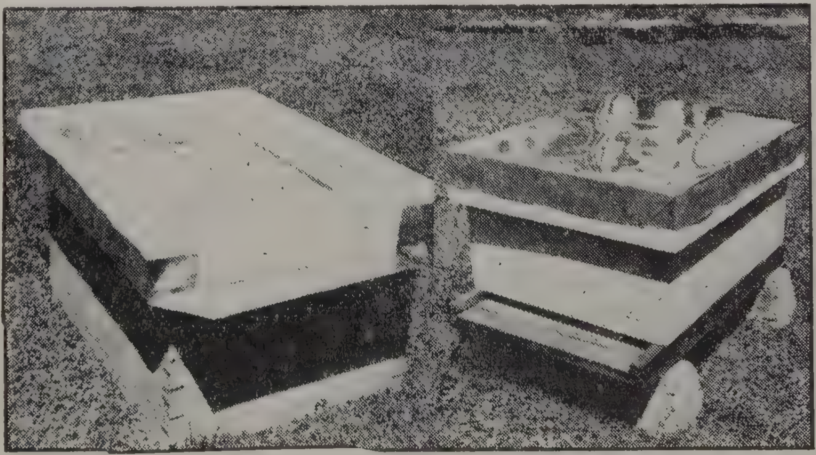

Fig. 9 (left)—Flat galvanised top of hive cover neatly hammered into position. Fig. 10 (right)—Ends of the metal bent into position.

life as possible. The wooden portion of the lid should be given at least one coat of paint before tacking on the metal cover. Many hive lids are ruined and leak at the corners when the metal is cut to allow the edges to be turned over. The metal should be neatly turned up at the edges lengthwise on the lid and tacked fast, after which the corners may be turned inward and the end folded into position as illustrated in Figs. 9 and 10. This work is best done by placing the lid upside down on the sheet of metal (placed on the floor) and using a hammer or wooden mallet to beat the metal neatly into place for tacking. Hive lids made this way give full protection in all weathers.

Floor-boards

The high cost of timber is now necessitating a revision in the types of floor-boards constructed. Fig. 7 illustrates a very popular and easily-constructed floor-board, but if totara timber is used for the runners, this floor-board becomes rather expensive.

Fig. 8 shows a type of floor-board which takes the minimum amount of timber, and, if used in conjunction with concrete hive-blocks, gives good service. The blocks are easily made as explained in an article in the "Journal of Agriculture" of May, 1946, and allow more ground surface than the first-mentioned floor-board to support the weight of the hive, which at times may amount to between 2 and 3cwt.

An estimate of the amount of timber required in the construction of 100 floor-boards is as follows:—

Type 1 Fig. 7	300 super ft. 6in. x 1in. *Pinus radiata*, which includes strips for rim. 132 super ft. 3in. x 2in. totara.
Type 2 Fig. 8	318 super ft. 10in. x ⅞in. *Pinus radiata*. 72 super ft. 2in. x 1in. totara.

The saving of about 6d. a floor-board in the cost of material for Type 2 as against Type 1 would help considerably toward the cost of concrete blocks, which are practically everlasting.

Conclusion

Owing to the great difficulty in securing supplies of suitable timber for the manufacture of hive equipment it has become essential for the beekeeper to see that material is made up as accurately as possible and assembled and painted so as to give maximum service.

Measurements of hive materials, including frames, are contained in Bulletin No. 267, "Beekeeping in New Zealand," obtainable from any office of the Department of Agriculture, price 2s. 6d.

Advantages of Spreading Liming Programme throughout the Year

[*Government Film Studios photo.*

By R. THAINE, *Assistant Fields Instructor, Wellington.*

OBTAINING lime in the right quantities at the right times is a frequent cause of worry to many a farmer. Often lime is available when paddocks are too wet for it to be spread or when transport is unprocurable. Such hold-ups in liming may have serious effects on the success of the general farming practice, and there is much to be said for the programme being spread throughout the year as far as possible.

UNLIKE most fertilisers and manures, lime is not quick acting, and the benefit from an application is spread over many months or even years. Well-ground limestone consists of particles varying in size from small, gritty pieces to dust. The larger particles may persist in the soil for longer than a year, but the smaller are dissolved more readily in the soil moisture. This period of benefit depends on several factors: The fineness of grinding, the nature of the deposit from which the lime is derived, and soil and weather conditions.

The advantages presented by those characteristics of lime are not put to the use they could be. As the action and benefit of lime are spread over months, a set time of the year for application is not necessary. Equal benefit will result if lime is sown in autumn, winter, spring, or summer.

Avoiding Peak Demand

The wise farmer will arrange his liming programme to avoid peak periods in the demand for the material. Autumn and early winter are invariably the busiest times for the lime-works, but their output is no greater then than at any other time of the year, so farmers requiring lime then are often delayed. Why should the liming programme not be spread throughout the year as much as possible? At harvest there is time for little else but bringing in the crops, but it is worth an extra effort to have lime put on a low-lying paddock during the dry months rather than run the risk of it being missed because the ground is too wet in autumn or winter. These paddocks which are "too wet to get on to" frequently are in great need of lime.

Another advantage gained from distributing the application of lime is that the expense incurred is not payable in a lump sum. That factor may seem minor, but it is of considerable importance to farmers who are not securely established.

Pig Broadcasts

Under the auspices of District Pig Councils broadcasts will be delivered in August as under:—

Auckland—1YA, on August 20, at 7.15 p.m., "Common Ailments of Pigs," by C. W. Wallace, Supervisor, Waikato District Pig Council.

Dunedin—4YA, on August 11, at 7.15 p.m., "The Choice of Breeding Stock and its Effect on Quality," by H. McDonald, Supervisor, Otago District Pig Council.

Palmerston North—2ZA, on August 15 at 7 p.m., "It is not too Early to Prepare for Next Winter's Feed Supply," by L. Marsdon, Supervisor, Wellington District Pig Council.

Napier—2YH, on August 14, at 7.15 p.m., "Preparation for Next Winter's Feed Supply," by H. Hopkins, Supervisor, Tairawhiti District Pig Council.

Growing Plants in Pots and Boxes

NOTHING adds greater interest to the home and garden than to have well-grown pot plants in the house and to raise at home the plants needed for bedding out in the garden. To do this successfully is not difficult, provided attention is paid to certain details. In this article, which will be concluded in the August issue of the "Journal," J. P. Hudson, Horticulturist, Wellington, describes the necessary steps to be taken in growing pot plants.

PLANTS in pots and boxes are growing under very artificial conditions compared with those growing out in the garden, and as these conditions are entirely controlled by the gardener, he has to pay attention to the details of cultivation to get the best results.

If this attention is given, however, there is no reason why any gardener, even without a glasshouse, should not raise his own plants for bedding out and have in his house an all-year-round succession of well-grown, decorative pot plants which will be a credit to his cultural skill and an ornament to his home.

The five fundamentals which should be mastered and which will be dealt with in detail are:—

1. Provision of a suitable soil medium.
2. Knowledge of the correct method of sowing seeds, pricking off, and potting.
3. When and how to water plants.
4. Correct conditions of light and temperature.
5. Control of pests and diseases if any appear.

Choice of Compost

The first and most important point is the careful choice, preparation, and mixing of the ingredients of the compost* to be used for seed sowing and potting.

The gardener may consider that, as seeds and plants grow well in his garden, he can use the soil from the flower border or vegetable garden just as it is for filling boxes and pots. However, conditions in the garden are quite different from those in a box or a pot, where a relatively-small volume of soil is isolated.

There are several reasons why the small volume of soil will give different results from the soil in the garden, but the most important is that the small volume dries out quite quickly and has to be watered fairly often to keep it moist.

It is common for pot plants to be watered at the equivalent rate of more than 100in. of rain in a year, and this abnormal "rainfall," coupled with fairly warm conditions and extremely good aeration, would soon reduce ordinary garden soil to a very unsatisfactory condition if it were used by itself for potting plants.

Loamy soil is still the main staple of a compost, but other items have to be added in correct proportion to make it suitable for box or pot work.

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*The word "compost" is a confusing one, as it is used in two quite separate senses by gardeners. A mixture of soils, fertilisers, and other ingredients prepared for filling seed boxes, pots, and other containers is called a seed-sowing or potting compost, and it is in this sense that the word is used in this article.

Garden refuse, green manures, and other materials put together and left to rot in a compost heap turn eventually into a form of organic manure referred to as compost. This usage of the word is quite distinct from that used here.

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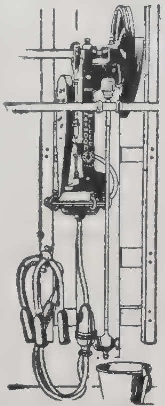

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No. 270: Oats.
No. 273: The Construction of Cherry Enclosures.
No. 274: Sheep and Wool Industry of New Zealand.
No. 276: Phylloxera-resistant Vines.
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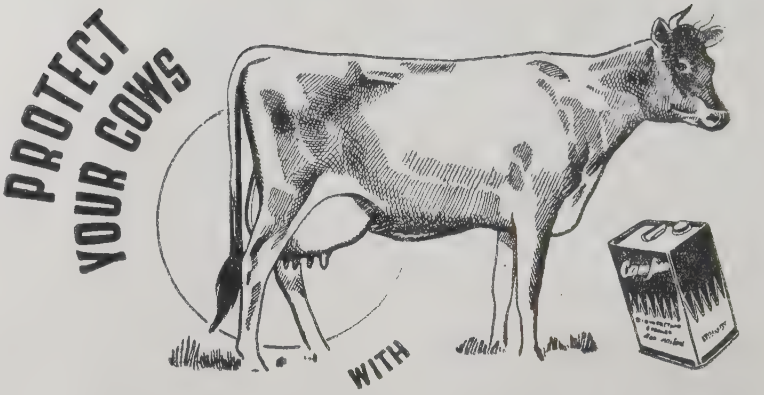

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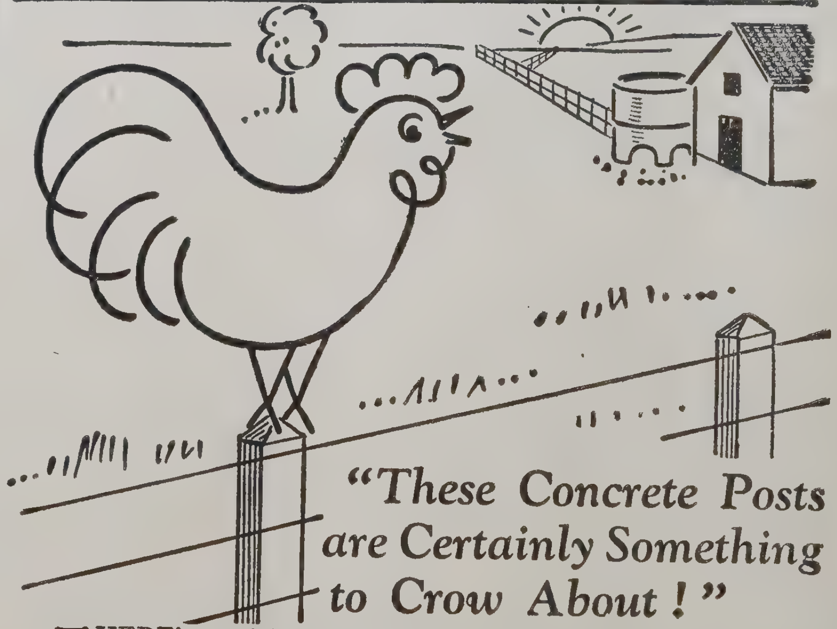

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Work of John Innes Institution

Gardeners are indebted to a London research station for one of the most interesting investigations ever made into practical gardening methods. The story behind those investigations is fascinating.

The John Innes Horticultural Institution, Merton Park, London, began in much the same way as the Cawthron Institute at Nelson. It was founded by private bequest in 1910 for the promotion of horticultural knowledge by research and teaching, but has grown enormously in the last 20 years and is now about to move to a much larger place in the country, where there will be more scope for future development.

The outstanding scientific work of the John Innes Institution has been in connection with genetics and the study of plant breeding, to which the staff of the institution has made a very notable contribution. The discoveries which are of immediate importance to every nurseryman and home gardener have been made as an interesting sideline to this more scientific work.

In pursuing their genetical studies the scientists required to raise large batches of plants, and it was often important that every single seed from a particular cross should be raised and grown on. This work was the responsibility of the head of the Garden Department and his staff, who were equipped with the usual facilities for propagating work.

Although the many batches of seeds were sown and grown on by competent plantsmen using traditional gardening methods, there were occasional failures which were annoying from a horticultural point of view, but were disastrous to the geneticists, to whom loss of a batch of seedlings might mean the frustration of long and patient breeding work.

Every nurseryman and gardener has had similar exasperating failures which could not really be accounted for, although they are often attributed quite wrongly to "bad seed," "bad soil," or "bad weather;" in fact, to anything but "bad growing," which is often the true reason.

The staff of the John Innes Garden Department therefore began a series of investigations into propagating methods to see whether more certain and uniform results could be obtained. Over a number of years they have investigated each aspect of the work in turn, from the original choice of soils and other ingredients for propagating composts to details of the treatment of the growing plants.

Mr. W. J. C. Lawrence, head of the Garden Department, once said, "Never let respect stifle your critical faculties." Working on this principle, the institution has investigated practices which have been hallowed by long horticultural tradition, and has found that these practices do not, in fact, always produce the best results. The long and painstaking experiments have borne such ample fruits, however, that plants can now be raised with much greater certainty than ever before by following exactly the advice given by the institution.

Among the most important recommendations are those concerned with making up the so-called John Innes composts in which plants are proving to grow so well.

The composts consist mainly of steam-sterilised loam, to which are added some form of organic matter to increase its water-holding capacity, coarse sand to ensure that surplus water can drain away, and fertilisers to provide the plant foods needed at the particular stage of growth at which the compost is to be used.

Choosing the Loam

When composting according to the John Innes methods the exact nature of the loam used is perhaps less important than usual, as the organic matter and sand will improve its texture and the fertilisers will provide the necessary plant food. It is still, however, important that the loam should be as nearly ideal as possible if the very best results are wanted.

The ideal soil is a good, fertile, medium loam which is neither too clayey nor too sandy and one in which plants or grass have been growing well. (Technically, a "loam" is a soil containing a mixture of fine and coarse particles and organic matter. A "clay loam" contains a high proportion of fine clay particles, and a "sandy loam" contains fewer fine particles and more large, coarse ones.)

Silty or clay loams should not be used, as they tend to cake in the pot. Soils which are light and sandy are also unsuitable, as they dry out too quickly after watering, and chalky soils give very poor results after being sterilised because of a chemical reaction caused by the heat.

Where possible the home gardener should obtain his loam from a fertile grass paddock by digging out turves 4 or 5in. thick and stacking them in a heap for a few months. The turves are best dug in early summer while the soil is still moist and there is a strong growth of grass. Dry turves will not rot down in the stack and should be watered if necessary. The stack should not be packed tightly or made larger than about 6ft. high or 8ft. wide if the turves are to come to best condition for propagating work.

If the loam is very poor, it can be made fit to use by incorporating up to one-sixth of its bulk of animal manure as the stack is built; but this introduces a variable factor, and it is far better to choose a suitable loam which does not require fortifying in this way.

The gardener should not be impatient to use loam before the grass and roots have rotted and disappeared, which usually takes about six months, but a loam which is left much longer than that will probably have lost some of its valuable humus by the time it is used.

Careful growers make a test of the loam before finally deciding whether it is suitable by filling a few pots with loam passed through a ¼in. riddle, and then sowing tomato and lettuce seed in it. At the same time seeds are also sown in pots filled with a loam which is known to have given satisfactory results. The pots are put in a warm greenhouse and the growth of the seedlings observed. If they grow as quickly and look as healthy in the loam under test as in the other, it is probably satisfactory; but if the new loam produces seedlings which are stunted, yellow in the leaf (probably caused by serious nitrogen deficiency), or purple in the case of tomatoes (deficiency of phosphorus), the soil is not really suitable.

Sterilising the Loam

Home gardeners have sometimes reported that plants, especially seedlings, did not seem to grow any better, or even grew worse, in sterilised than in unsterilised soil. This has usually been the result of a misunderstanding on their part of the principles of soil sterilisation.

When soils are heated to a temperature approaching the boiling point of water the first and most obvious result is that all injurious insects, other forms of animal life, fungi, and weed seeds are killed. All these effects are beneficial and should result in better growth of plants.

At the same time, however, the heat causes a complex chemical change, which is still not fully understood, in the humus whereby nitrogen is released in a form immediately available to plant roots.

The amount of nitrogen liberated depends on various factors, but far more than is good for most plants, especially at their seedling stage, is released if the soil is heated too long or at too high a temperature, if the soil is very rich in humus, if leaf mould, etc., is mixed with the soil before sterilisation, or, especially, if the soil is chalky or if lime has been added to it before it is sterilised. This explains why a compost should never be sterilised after the ingredients have been mixed.

The "free" nitrogen seems gradually to be locked up again in the soil, and it is for this reason that gardeners always used to keep sterilised soil for about six weeks before they used it. It is now known, however, that the addition of a little superphosphate will at once counteract the effect of this "free" nitrogen, and also seems to make the seedlings more resistant to disease and cold.

If soil is sterilised before it is mixed with the leaf mould, lime, and other ingredients, and if superphosphate is added, the compost can be used at once for seed sowing, pricking out, and potting without showing any of the ill effects of soil sterilisation, and will be of great advantage to the plants.

The longer period of heating and higher temperatures which were recommended in the early days of soil sterilising have been found to be unnecessary and even undesirable. Wherever cases of failure have been investigated it has nearly always been proved that the soil had been over-heated or sterilised too long. One of the reasons why baking soil is less satisfactory than steaming is that the humus in the soil may be ruined if heated to temperatures much above that of boiling water (212 degrees F.).

Soil can be considered sterilised when **all of it** has been heated to a temperature of at least 180 degrees F. for about ten minutes, after which the sooner it is cooled down to normal temperatures the better.

Soil Sterilising in Laundry Copper

The home gardener can sterilise his soil in several ways, but the principle in each case should be to expose the soil to the heat in relatively-thin layers so that it heats through quickly and does not have to be over-heated on the outside to bring the inside temperature up to the desired point. Moreover, a suitable thermometer should always be used for at least the first few times until the method has been well tried out, to make sure that all the soil is, in fact, heated to the necessary temperatures for the stated time.

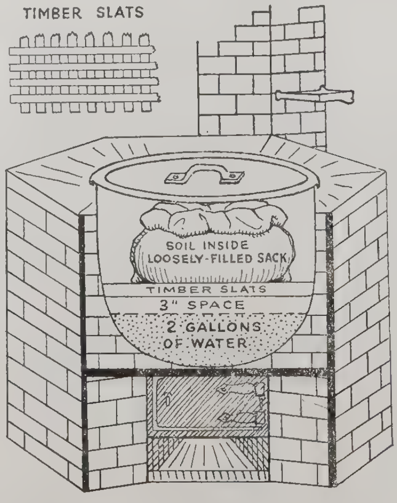
The easiest and most satisfactory way of sterilising soil at home is in the laundry copper. Pour 2 gallons of water into the copper, and make an open framework of wire or wooden laths to wedge in the copper about 3in. above the water level. (The space is left to reduce wetting of the soil by splashes of boiling water.)

Wet or even moist soil cannot be sterilised efficiently by low-pressure steam. The soil should therefore be dug when dry, and protected from the weather, or allowed to dry out in a shed before it is sterilised. It should then be sieved through a ⅜in. riddle to ensure that there are no lumps, and put into a coarse, open-weave sack or, better still, a tin tray such as a dustbin lid, in the bottom of which numerous small holes have been punched.

If a sack is used, it should be only partly filled and dumped out on the framework in the copper in such a way that it almost covers the whole surface, but it should not touch the sides of the copper, as this may lead to the sack charring and bursting. Put the copper lid on and keep the water boiling vigorously.

Storing Sterilised Soil

After the temperature **in the middle of the soil** has been maintained at at least 180 degrees F. for ten minutes it can be considered sterilised, and can be removed from the copper to cool. Unless the soil is to be used at once, it should be stored in a clean box or bin and not left lying in a heap exposed to the air, as this is likely to lead to its recontamination by disease spores.



Method of sterilising soil in laundry copper.

If the copper is to be used for sterilising further batches of soil, do not forget to add more water to replace that lost by evaporation, and prevent the copper boiling dry.

Although these methods of sterilising soil are quite satisfactory for home gardeners, the commercial grower needs a method which is more suitable for treating large quantities of soil, preferably one using high-pressure steam. Various types of equipment are in use, including one or two ingenious and labour-saving methods devised by New Zealand nurserymen. Details of soil sterilisation on a commercial scale can be supplied by the Horticulture Division.

Use of Leaf Mould or Peat

Peat is a material formed from partly-rotted vegetation which collects under certain conditions in wet places in layers which may be many feet thick.

Some peats are heavy, slimy, very acid, and quite unsuitable for horticultural use, but others are fibrous, non-dusty, uniform in quality, sterile, free from weed seeds, not very acid, and ideal for use in composts, as they serve to prevent them from drying out and ensure adequate aeration.

Carefully-chosen peats are bought in tremendous quantities by nurserymen and gardeners overseas, but these grades of peat do not seem to be available to gardeners in New Zealand, although no doubt there are natural deposits of suitable peat in this country which, if properly marketed, would probably meet a ready demand.

As suitable grades of horticultural peat are not available to most gardeners, some other form of organic matter must be found. Leaf mould seems to offer the best substitute, although it is so variable in quality that it will not give such uniform results as a suitable peat.

A well-made manurial compost is another possible alternative, although it is even more variable than leaf mould, and should be used only after a small-scale trial has shown its suitability, as it may be far too rich.

Whether leaf mould or manurial compost is used, the material should be sterilised before use in the same way as described for the loam. It is essential that it should be sterilised separately and not after being mixed with the loam, or very poor plant growth may result for some reason which is still not completely understood. Peat is already sterile in the horticultural sense and does not normally require sterilising.

Leaf mould collected from under deciduous trees seems to give better results than leaves collected from the same trees and rotted in heaps. Trials have not so far shown that leaf mould from chestnut, plane, or even walnut trees is detrimental to use; but there is no evidence of the value or otherwise of leaf mould from native New Zealand species.

Sand Must be Added to Compost

Under the artificial conditions which exist in a pot or box it is necessary to add sand to the compost to make sure that the soil does not become caked on top or waterlogged in the middle, and also to facilitate the passage of water through rather than round the outside of the ball of soil.

To achieve these objects, fine sand is useless. The best sand to use consists of angular pieces grading up to ⅛in. in diameter with a high proportion of larger pieces to the finer ones. Sea sand is usually unsuitable because of the salt content and also because it usually contains crushed shells which upset the lime content of the compost.

John Innes Composts

There are only two standard "recipes," the John Innes seed-sowing composts for seed sowing and pricking out seedlings, and the John Innes potting compost for potting plants. They are made up as follows:—

Seed Compost

2 parts (by bulk) of sterilised loam
1 part (by bulk) of peat or leaf mould
1 part (by bulk) of coarse sand

Plus

1½oz. superphosphate* and
¾oz. carbonate of lime to each bushel of main ingredients

Potting Compost

7 parts (by bulk) of sterilised loam
3 parts (by bulk) of peat or leaf mould
2 parts (by bulk) of coarse sand

Plus

1 3/5oz. hoof and horn (coarse grade)
1½oz. superphosphate
4/5oz. sulphate of potash
¾oz. carbonate of lime
to each bushel of main ingredients

A standard apple box marked inside to show a quarter and half of its depth makes a useful measure for estimating a quarter, a half, and a bushel of soil.

If necessary, dried blood at the rate of 1½oz. per bushel may be used as a substitute for hoof and horn, although it is not as satisfactory.

Sulphate of potash is at present not available, except for certain special industries, but muriate of potash at the rate of ½oz. per bushel of compost has given satisfactory results.

Although dried blood can be substituted successfully for hoof and horn, and muriate of potash for sulphate of potash, only one of these substitutions should be made. Poor results seem to follow if muriate of potash and dried blood are both used in the same compost.

The correct amounts of fertilisers as set out above should be used, and not exceeded. There is no question of a bigger dose giving better results; it would be more likely to do harm.

Carbonate of lime (the lime sold as garden lime) is suitable for these composts. Quick or burnt lime is **not** suitable, and should not be used for pot plants.

Mixing the Composts

The ingredients of these composts are all very carefully chosen, both as to kind and quality, and most plants will grow better in them than in any other mixtures so far tried. However, they are successful only when the composts are properly mixed, as inefficient mixing can ruin the compost by throwing the ingredients out of balance.

The correct way to mix compost is to put the soil in a flat layer (not a heap) on part of a clean floor or bench, put the leaf mould or peat in a similar flat layer on top of the soil, and then spread half the sand as a third layer. Mix the fertilisers and lime thoroughly with the other half of the sand, and place the mixture in an even layer on top of the others.

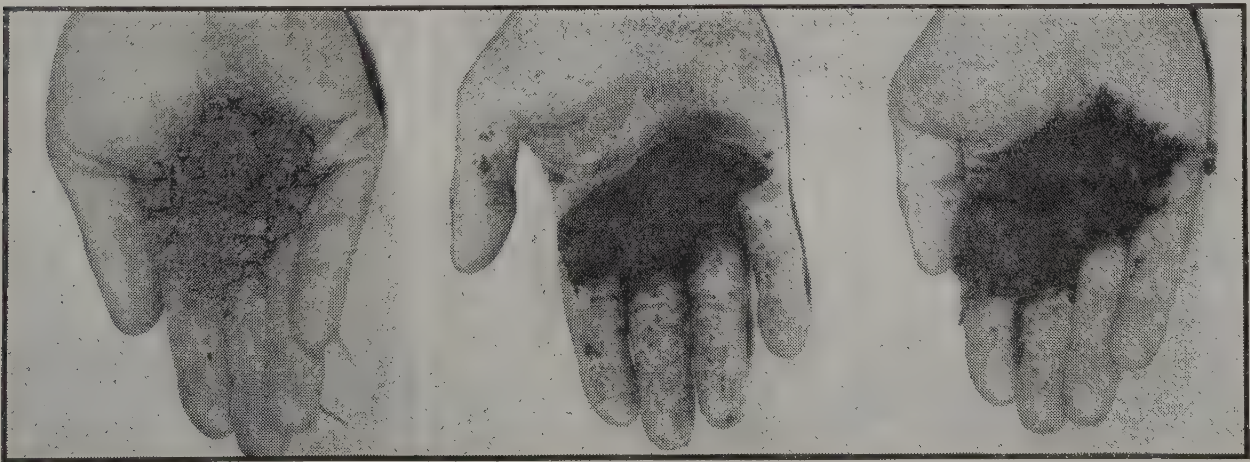
To mix, start at one end and take off a "strip" of the various layers by shovelling away at floor level, working the shovel at right angles to the long axis of material. As material is shovelled away it should be spread in an even layer and not heaped up. This will result in the end of the original heap having a vertical "face" from which chunks of the different materials in the correct proportion will fall.

Three turnings in this manner should suffice to give a perfectly-uniform mixture. Large-scale growers often use a portable concrete mixer for this work, thus saving a great deal of time and heavy work. However, it will produce a uniform compost only if the various ingredients are very carefully stacked in even, flat layers in the first place, and shovelled intelligently from the heap into the concrete mixer. Incorrect shovelling can easily result in a batch of compost having far too much or not nearly enough fertiliser and so causing detrimental results to the plants subsequently grown in it.

"Potting Condition"

Before compost is used for seed sowing, pricking out seedlings, or for potting it should always be in proper "potting condition"—that is, when a handful is squeezed and the hand opened again the ball of compost should not fall to pieces (too dry) nor should it leave the hand wet and remain in a compressed ball (too wet), but should just crack across in two or three places without crumbling.

This is a measure of the moisture condition, which is most important if plants are to grow well. If the compost is used too wet, it cannot be made firm in pots or boxes without caking and spoiling its physical condition and using a dry compost may cause serious damage to the roots and will result in too loose potting.



Before compost is used it should be in proper "potting condition." Left—If the soil crumbles, it is too dry. Middle—If it remains compressed, it is too wet. Right—Correct "potting condition." Note cracks across soil.

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*1½oz. superphosphate=2 level tablespoons plus 2 level teaspoons.

¾oz. carbonate of lime=1 level tablespoon.

1 3/5oz. hoof and horn=3 level tablespoons of the grade at present on the market.

4/5oz. sulphate of potash=1 level tablespoon plus 2 level teaspoons.

1½oz. dried blood=3 level tablespoons.

½oz. muriate of potash=1 level tablespoon.

On no account should a compost be used when it is sticky or an attempt be made to wet a dry one by watering after it has been used.

If the compost is too wet, it should be spread out under cover, covered with sheets of newspaper, and left until it has dried out sufficiently. If too dry, it is best moistened by spreading out in a thin layer, sprinkling with a watering-can fitted with a rose or a syringe, and adding another layer of compost, sprinkling again, and so on, finally covering the heap with clean sacking. This method ensures a uniform wetting of the heap, which should be ready for use the following day.

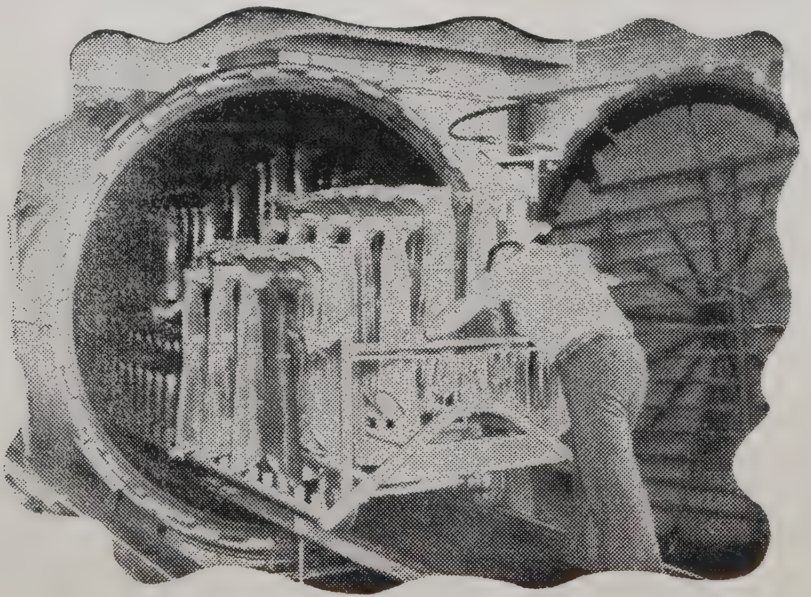
Soil which has been sterilised may be kept for three or four months, providing it is not more moist than "potting condition," the heap is loose, not trodden, and not too large.

On the other hand mixed composts should be used within a few weeks, and should not, in any case, be kept for more than two months before being used, as compost deteriorates slowly in storage and becomes acid.

Sale of Prepared Compost

The instructions for preparing seed-sowing and potting composts according to the John Innes specifications will no doubt sound highly complicated to home gardeners who are not familiar with the work. Those who have actually done it will agree, however, that it is not really difficult to prepare these composts correctly if the instructions are closely followed, and all who have used the composts speak enthusiastically about the results they have achieved by growing plants in them.

It is rather surprising, however, that seedsmen do not offer these composts ready mixed for sale more often to customers who want only small quantities which it would not be worth their while to prepare themselves. A bushel of compost will go a long way in a home garden, and a quarter of a bushel would be enough for most home gardeners for the annual repotting of their home plants.



The Mighty Chamber in which

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Here is another view of the wonderful "Marathon" Factory—the giant Vulcanizer where, under tremendous pressure, Marathon Gumboots are processed to ensure complete resistance to water. Look for the "Marathon" Brand—it's your guarantee of complete satisfaction.

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The cost of this compost would be small compared with the added enjoyment which really well-grown plants will give. There seems an opening for nurserymen who already mix John Innes composts for their own use to supply some to the retailer. Compost to be offered for sale in this way should be stored in much drier than "potting condition," as it will then deteriorate less if not sold at once.

Summary

Best results are obtained if boxed and potted plants are grown in prepared "composts" made from sterilised soil to which other ingredients, including fertilisers, have been added in the correct proportions. Two types of composts are desirable, one for seedlings and one for potting; but nearly all plants in which the home gardener is interested can be grown successfully in one or other of these.

It is well worth while to go to the trouble of preparing the composts correctly to give best results and to reduce the chances of failures.

For commercial growers the advantage of using the seed-sowing compost for sowing and pricking out bedding plants is that a healthy, uniform line of plants is produced and no time will be lost in disease control or in weeding boxes. Moreover, plants will continue growing in the recommended compost for longer than in less suitable ones, and are thus in saleable condition for a longer period. In timing seed sowing, however, it should be borne in mind that plants usually reach saleable size a few days sooner than usual when grown in the John Innes seed-sowing compost.

It is understood that 60 per cent. of British nurserymen are now using the John Innes composts. One said recently: "We did not know until using these composts just how well plants can grow."

Recommended Reading

Those who wish to follow the whole fascinating story of the John Innes Horticultural Institution's investigations are recommended to read "Seed and Potting Composts," by W. J. C. Lawrence and J. Newell, published by George Allen and Unwin, price about 8s. 6d. in New Zealand. Every commercial nurseryman and home gardeners interested in raising seedlings and pot plants should read this book, which was revised and republished in 1942.

Photos by Photo News Ltd.

A USEFUL SMALL SHEEP CRUSH

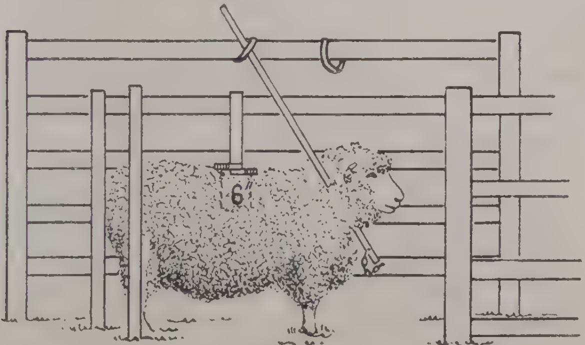
By J. G. RICHARDS, *Instructor in Agriculture, Balclutha.*

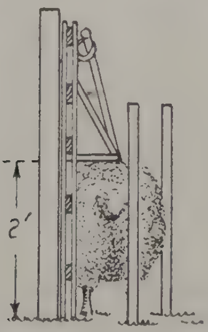
GOOD livestock husbandry, particularly in intensive farming, entails giving each animal individual attention from time to time, and it is usual to carry out in the sheepyards such operations as drenching, mouthing, and foot-rotting. Manhandling sheep all day in the yards can cause much fatigue to the workers, especially if the animals are stubborn.

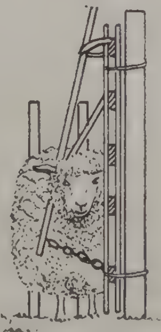
ANY aids which lessen fatigue and temper during yard work must be worth consideration, and the sheep crush described is one which Mr. A. V. King, of Clydevale, Otago, finds helpful when injecting ewes with the entero-toxaemia vaccine for the control of pulpy kidney.

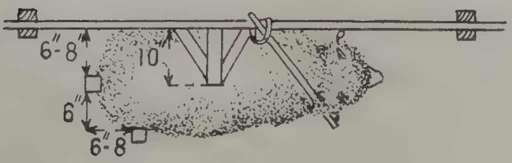
Injecting sheep is a two-man job, one to hold the sheep while the other performs the injection. Unless the person holding the sheep has a strong grip of the animal, its struggles when the needle is inserted are often sufficient to break the needle. By using the crush Mr. King is able to hold the animal very firmly and allow the assistant to have both hands free to part the wool.

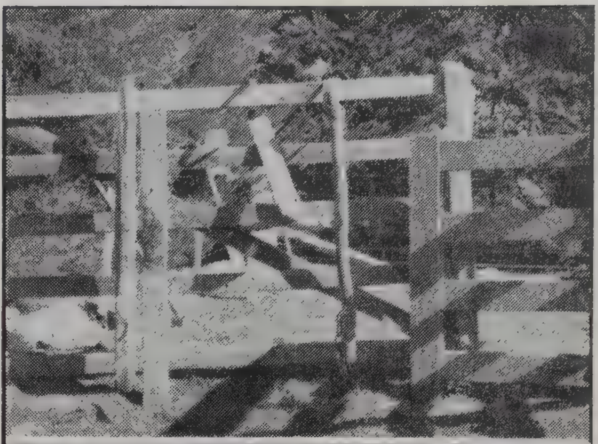
The cost of construction is very small, and the time taken to set it up, whether in the main sheepyards or in temporary paddock yards, is but a few minutes.











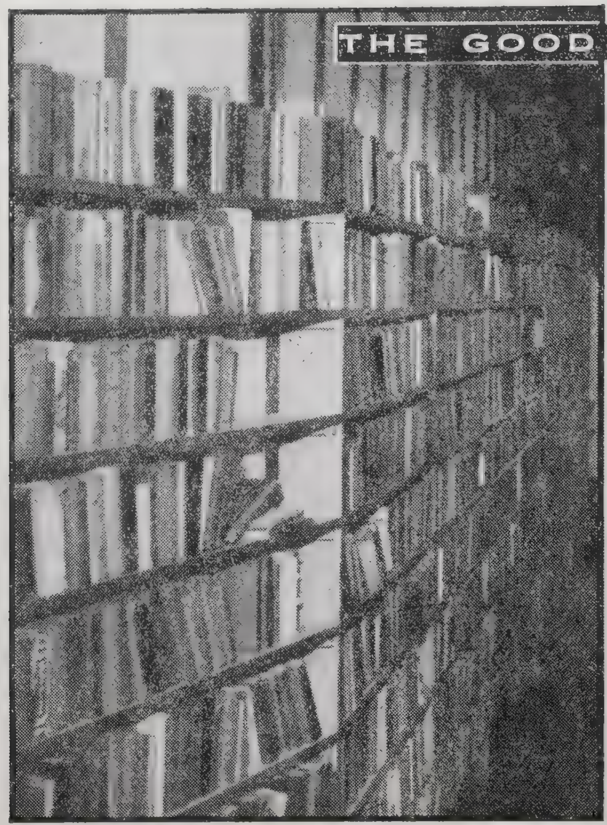
Materials required are:—

- An ordinary farm hurdle.
- Two 3in. by 2in. pointed stakes about 4ft. long.
- Two pieces of leather strap.
- 6in. to 8in. of light chain with a swivel in the centre.
- A piece of light pole about 3ft. long.
- Three pieces of timber 18in. by 3in. by ¾in. to form the bracket which rests tightly on the animal's back to arrest upward movement.

The photographs and the diagrams show the construction of the crush. On the left of the photographs are the two 3in. by 2in. stakes into which the rump of the animal is placed; they are 6in. and 12in. from the hurdle, and the outside one is about 6in. in front of the other. The bracket which rests on the sheep's back is attached to the second and middle bars of the hurdle. On the top bar are the leather straps which hold the halter pole; two straps are used to allow for adjustment to the size of the animal. The halter pole is attached by the chain to the bottom bar at a distance from the stakes which depends on the length of the sheep. The swivel in the chain obviates knotting.

The hurdle and the exit gate form a V rather than a straight line, so that when the gate is opened the sheep has a better view of the yards and will leave the crush more rapidly and without assistance from the shepherd.

The lower illustration shows the sheep securely held in the crush. It is unable to move forward because of the halter, backward because of the stakes, or upward because of the bracket.



"Great Store of All Sorts of Books"

DUNEDIN, city of mists and hills and slender grey spires, has the distinction of possessing the shop containing the most extensive stock of books in the Southern Hemisphere, a collection surpassed numerically by only three other shops in the world. The modest exterior has no gaudy book jackets, no colourful placards to draw attention to the vast resources within, the limited window space being taken up with books of varying types and topics, open at an interesting chapter or illustrated frontispiece so that the passer-by can spend a few moments in pleasant perusal before entering the portals of bookland.

NO matter what your quest, whether you are looking for rare editions or recent thrillers, practical text books or poems long out of print, you are sure to find something to suit your needs. Moreover, if you wish to keep au fait with some special subject, such as Arab horses, antiques, or Antarctic exploration, your enquiry will be duly noted and you will be informed of any publications in that line as they come to hand. There is always a keen waiting list for books on New Zealand, particularly those pertaining to plant and bird life. The extreme effectiveness of the filing system and the extent to which clients make use of this service can be gauged from a glance at the hundreds of volumes in the "Requests Fulfilled" section awaiting despatch. The diversity of public taste is readily apparent in the demand for the works of writers having such widely differing styles as Dickens and Donn Byrne, Lafcadio Hearn and Ethel M. Dell. Yogi philosophy is companioned by practical blacksmithing and the latest treatise on psychology, and the wit of Noel Coward's plays serves as an antidote for Burton's "Anatomy of Melancholy." The daily mail may bring letters from as far afield as Great Britain and Russia. For instance, one Londoner wrote asking for Edward Lear's poems, which were unprocurable in England; a copy was promptly forwarded. The firm also has a large American clientele.

Spacious as the ground floor is, with bookshelves occupying every available inch of wall space, and counters divided into convenient compartments, it holds only about one-fifteenth of the stock, which is estimated at 338,000 volumes. Two libraries are stored in another building, but the rest are housed in the rooms overhead, the overflow being accommodated down in the cellars. In the cellars a musty smell prevails and there is a faint, eerie sound of trickling water, and your footsteps seem to echo softly on and on long after you have paused to pick up some dusty tome. The shadows lie thick in the farthest corners, and fragments of half-forgotten smuggling stories creep unbidden to your mind. The old tin trunk athwart a pile of boxes and papers looks as if it might have held glittering jewels or gold doubloons. But these are not the only forms of treasure; a valuable set of records relating to the early transactions of the Provincial Council of Otago and Southland was discovered here a while ago, and it is exciting to speculate as to what other finds await some future seeker in these cold, dim caverns.

Back in the bright light of the shop proper the feeling of timelessness, of being able to enter an enchanted world at will. is intensified. Through the medium of the printed page you can wander through any country, any period of history you please. You can explore the England of Chaucer, of Shakespeare, or Dickens; you can contrast the forbidding regions of Dante's Inferno with the fabled splendours of the Arabian Nights; you can follow the paths of faery of which Spenser and Keats sang so exquisitely, or the feats of the ancient Greek heroes in the Homeric epics—the whole realm of literature is yours from which to choose.

As you climb the fanshaped staircase to the first floor you will find it fully in keeping with the romantic atmosphere that the landing window has a central panel of stained glass depicting a knight in armour, the surrounding design being in medieval blues and greens. The speediness of your ascent will be in proportion to your interest in the books stacked on the stairs—a literary guard of honour drawn from such sources as "Fables and Proverbs from the Sanskrit"; "The Transactions of the New Zealand Institute"; Ibsen's and Barrie's plays; "Fritz and Eric—the Brother Crusoes"; "Hints for Amateur Actors"; "The Legends of Charlemagne"; "The Lighter Side of Irish Life," etc.

Extending lengthwise down the long room above there are three separate sets of floor-to-ceiling shelves supplementing those lining the walls. The fiction is grouped in alphabetical order and a certain rather whimsical humour appears to have accompanied the arrangement. Who would have expected to see the delicate lavender and old lace romances of Myrtle Reed next to Remarque's grimly realistic "All Quiet on the Western Front," or Ethel Turner, beloved of bygone generations of schoolgirls, sandwiched in between W. M. Thackeray and Booth Tarkington? The gentle "Elia" upholds the prestige of the essayists together with E. V. Lucas, but from the point of view of quantity and variety of covering they are outweighed by the ponderous Macaulay. At one end of the room reposes an assortment of musical monologues and modern ballads, and nearby is a sufficiently comprehensive collection of Bibles, psalters, and hymnals to satisfy the most earnest theological students. Darwinism has its place, too, as well as philosophy and sociology, and there are text books on plumbing, accountancy, nursing (the medical volumes have most impressive leather bindings!), and sundry other occupations, and a whole section is devoted to the Bohn Library and another to books dealing with the Great War. The Foreign Languages department, particularly the French portion, has benefited greatly by the addition of the library of the late G. M. Thompson, Professor of Modern Languages at Otago University, and the Art section has likewise been augmented by the notable collection of the late Rector of Waitaki Boys' High School.

Publications on culinary matters are plentiful, also, thanks to the owner's penchant for the subject; he recently gave a most successful series of radio lectures on famous chefs. Here you can obtain information on every aspect of catering, from "La Veritable Cuisine de Famille," with its elegant menus and elaborate methods of preparation, down to the simplest everyday dishes and paper bag cookery. Nelson's "Home Comforts" (published in 1889) afford excellent advice upon how to regale your guests with such hearty fare as turtle soup, collared eels, and mutton collops, or you can enhance the pleasures of the table by reading extracts from Bellows's "Philosophy of Eating." Those who prefer a more scientific approach can study "The Chemistry of Cookery" or take a course in home economics. No reference to cooking would be complete without mention of the infallible Mrs. Beeton. Her "Book of the Home," which purports to be a guide to all matters pertaining to family welfare, is still a best-seller where cook-books are concerned; the coloured illustrations alone would give a fillip to the most jaded appetite! Many of the recipes are much too lavish to be practical under the present system of food rationing, but people continue to cook in accordance with her directions where ingredients permit. This book, which is in such constant demand, was compiled from the domestic column Mrs. Beeton conducted in a newspaper published by her husband. Though he edited numerous publications, including "All About Gardening" and an anthology of English poetry with biographical notices from Chaucer to Pope and sketches of the history of poetry during each period, it is his wife's contribution to domestic literature which has made the name of Beeton a household word. Who knows what other improvements she might have effected in the art of housewifery had she not died at the regrettably early age of 27?

A corner stairway leads to the top storey. Walls and rafters are whitewashed and a pair of skylights make the sloping ceiling seem as if it is set against the sky. At one side of the old-fashioned fireplace a dozen shelves rise tier upon tier to hold the works of Shakespeare. The sets range from tiny pocket editions to enormous tomes bound in calf and ornately lettered in gilt. Several shelves elsewhere are given over entirely to books about the Immortal Bard, Jaggard's "Bibliography of Shakespeare" being the one most used for reference. The outpourings of the poets of the classical school are arrayed close at hand for your perusal, or else you can hunt for childhood favourites among the rows of children's books. The most precious gems of juvenile literature are "Grimm's Fairy Tales" (the first edition to be illustrated by Arthur Rackham) and several of the series by S. C. Woodhouse, M.A., (Oxon.): "My Friend the Umbrella," "Too Good To Live," and "Eliza Gramp—the story is a sad one, but the moral's simply grand!" When they were printed in the early 1900's the publishers termed them the "Dumpy Books," which is rather a misnomer, as they are a slim oblong shape and attractively bound in blue, red, or green. The coloured pictures drawn by the author possess a particularly live quality.

The teen-age taste for thrills in those days was catered for by "Tip Top Tales," setting forth the amazing adventures of Sealskin Sam the Sparkler, Flora the Flower Girl ("You are my prisoner, miss!"), Wizard Will the Boy Detective, and his Vagabond Pard. These paperbacks, valuable because so few of them have been preserved, are the forerunners of the radio serials in bringing the element of suspense to a fine art, for the characters progress from one predicament to another, the following being typical of the footnote to be found on the last page: "If you want to know what became of Flora and whether Elegant Ed escaped from drowning, you must read 'The Ferret Afloat' or 'Wizard Will's Last Case'."

If you are interested in first editions, the selection downstairs will give you ample scope for indulging your hobby. Here are displayed R. L. Stevenson's "Catriona," Tennyson's "Enoch Arden," Longfellow's "Miles Standish," novels by Mark Twain and Arnold Bennett, the poetical works of Shelley, and "French Poets and Novelists," by Henry James, to mention but a few titles at random. There is even a sprinkling of New Zealand writers. Some of the most costly items are kept in a glass showcase and include "A Feast for Wormes," by Francis Quarles (though the calf binding is a trifle worn in places, it is really in a remarkably good state of preservation considering that the date of publication was 1664); Thomas Hardy's "Return of the Native" (the drab brown covers are no criterion whatever of the worth of this trilogy); and "The Comic Almanack" (1835-43), with its clever caricatures by Geo. Cruikshank. The versatility of this prolific illustrator is well demonstrated by the woodcuts which are such an appropriate feature of the first English edition of that heartrending classic "Uncle Tom's Cabin."

It has been said truly that books, like proverbs, receive their chief value from the stamp and esteem of ages through which they have passed. This is especially applicable in the case of rare volumes and first editions, but scarcity is also an important factor in assessing their monetary worth, and the bookseller responsible for the task needs not only specialised knowledge but a goodly collection of "books about books." In the neat little office beneath the stairs, with its quaint iron stove, carved-back chairs, and Tyrolean peasant pictures in gay, clear colours, the owner of this unique shop keeps the tools of his trade:—London book auction records; books on printing and publishing; bibliography (compiled by scholars who are authorities on the work of a particular author)—over 4000 standard reference books. "The Cambridge Bibliography of English Literature" and Brunet's "Manuel du Libraire et de l'Amateur de Livres" are most frequently consulted, and this exceedingly fine reference library also contains McKerrow's "Printers' and Publishers' Devices" and a huge 4-volume "Historical Catalogue of Printed Bibles" (Darlow & Moule), possibly the only set in New Zealand.

As you leave this booklovers' paradise you feel that books indeed give to "all who will faithfully use them the society, the spiritual presence of the best and greatest of our race."

Mary

Photographs by Jack Welsh and Sons.

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A GIRL'S WINTER COAT: New Life for an Old Garment

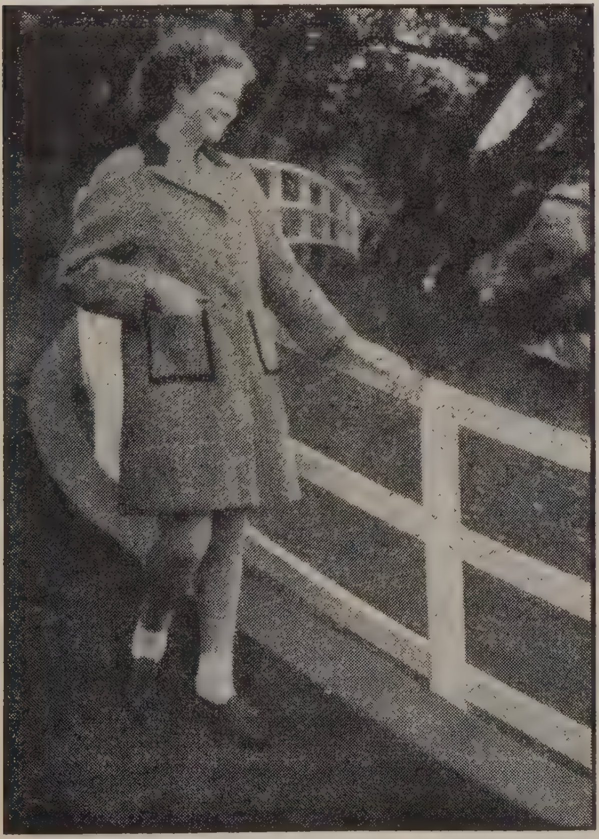
By EVA TOPPING, *Rural Sociologist, Auckland.*

A WINTER coat is usually the most expensive item of a schoolgirl's wardrobe, and one that recurs as she grows, so making her coat at home can be a real economy. Many mothers think that making a coat is too big a task to tackle, but there are plain, straight-line styles which are not difficult to make successfully. There may be an adult's coat which can be adapted, and remaking or even just relining an old coat are good ways of learning a great deal about coat construction.

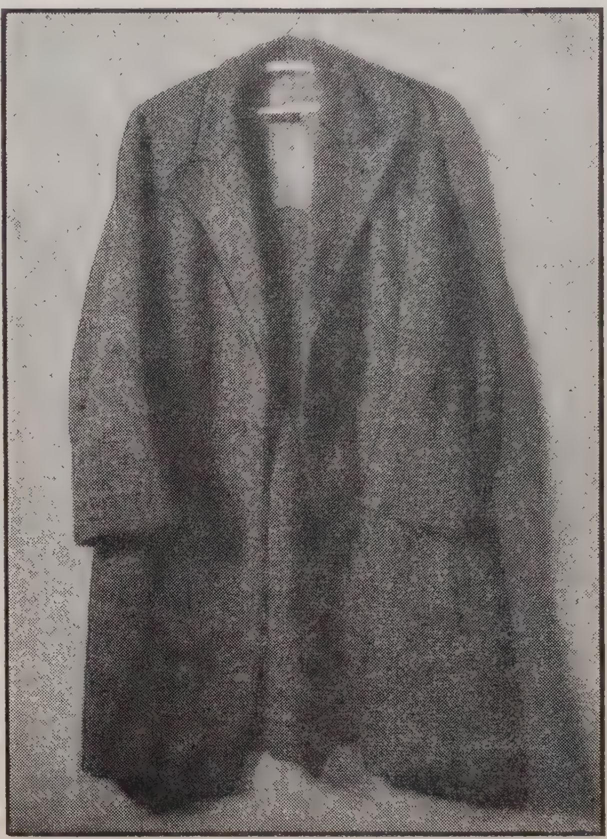
BEFORE deciding to remake any garment, inspect it carefully to make sure its condition is sufficiently sound to make the work worth while. Hold it up against the light to find moth holes; look at the wrong side to see whether the colour is better; examine the wearing points—the cuff edges, collar, elbows, and hem.

Then consider the shape of the parts in relation to the new style proposed. The man's coat illustrated had a Raglan sleeve cut in three sections, so any other style of sleeve was ruled out for the girl's coat. Similarly, if the coat under consideration has a set-in sleeve, it is most unlikely that a different type will be possible in the remade coat unless it is for a much smaller person.

Pockets can be a problem, too. The man's coat had long, slanting, slit pockets which would have been in the wrong place on the girl's coat, as it was to be shorter. The slits needed disguising, and patch pockets are the obvious solution in a case like this, though the material is often hard to find. This time the ends of the front facings were used, with an added outline of velvet to make them large enough and more important. If the coat already has patch pockets they will probably be worn and baggy; then the new model can have straight slit pockets with flaps made of the better parts of the old pockets.



Model and new garment bright and cheerful.



The original—discarded and forlorn.

The collar is another point to consider. When it is badly worn or discoloured, a top facing of velvet, soft leather, fur fabric, fur, or closely-woven woollen material in a plain toning or contrasting shade will be smart on the new coat. Brown velvet was used on the girl's coat, matched by pocket trimmings and the bound buttonholes.

If the old coat has no belt, it is hard to find sufficient material to make one unless a strip can be taken from the hem line. A half belt at the back might be possible, but the straight-hanging styles suit most young people, and usually a belt can be omitted.

Preparing the Material

When all these details have been considered and the knotty points debated, the work begins with careful unpicking. Take every seam undone, remove all linings, stiffenings, and buttons and save them for later use. Make a note of the methods of construction and details of finishing as a guide in making up the new coat. There will almost certainly be little piles of fluff at the hem lines, in the seams, and at the ends of the sleeves; scrape them off with a blunt knife and brush the material well.

If the coat is very soiled, washing is indicated. First mend any small holes or tears, using threads of the fabric or fine wool in a matching shade; draw any slits (such as pocket openings) together with herringbone or similar stitch to keep the fabric flat; and run a firm thread round curved edges like the neck and tops of sleeves, to prevent the material stretching when it is wet. Make a soapy lather with the water only comfortably hot, and knead and squeeze the pieces of cloth, but do not rub or wring them. Wash the material in two or even three lots of soapy water if necessary, then rinse it well, keeping all waters the same temperature. Hang the pieces to dry by folding them over the line; do not peg them by the corners or they will be pulled out of shape.

Press the pieces while they are still damp, taking care not to stretch them and using a cloth between the iron and the material.

Recutting

If the coat is to be made by a new pattern, pin the paper pieces together and try them on, making any adjustments necessary before cutting the material. The coat illustrated was remade in the same style as the original, making adjustments at the sleeves, side seams, and front, and under the arms. The length was not altered so that a good hem width would allow for letting down when necessary.

FACINGS AND INTERFACINGS

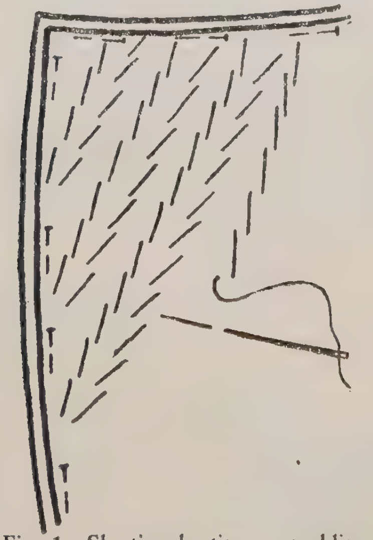


Fig. 1—Slanting basting or padding stitch.

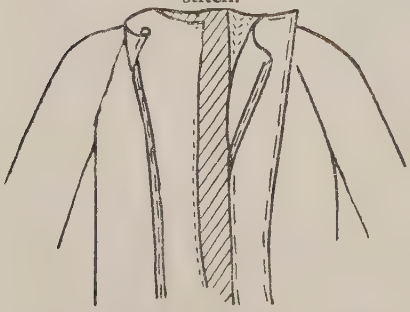


Fig. 2—Putting in front facings: Right side, facing stitched on the outside of the coat; left side, turning the facing back over the stiffening to the inside of the coat.

First Steps in Making Up

Pin the seams together and try the coat on with the raw edges out. Adjust the width of the seams to give a good fit, making allowances for the heavier clothing which will be worn under the coat in the colder weather. Raglan or improved Raglan styles should also have the sleeves pinned in for this first fitting, but set-in sleeves should be left out.

Baste, stitch the seams from the top down, and press them open. Press each piece of the work as it is done, for the shape must be pressed into the coat as it is made—it is difficult, if not impossible, to do it afterward.

Front Interfacings

Next, the stiffenings or interfacings must be put in. They can be cut from the old interfacings, using the pattern or the front facing as a guide. Pin them into place, baste them round the edges, and attach them to the coat with slanting basting or padding stitch (Fig. 1). Use a fine thread which matches the coat and take tiny stitches through interfacing and coat. Make the stitches about 1in. apart and do not let them show on the right side of the material.

Facings

When the interfacings are in, join the coat fabric facings to the front, trim the edges, and press them back into place. Tack the facings down the front fold and at the inner edge (Fig. 2).

Collar

Face the under-collar section with stiffening, using padding stitch as for the front interfacings, and rolling and shaping the collar with the hands as the stitching proceeds. Make rows of running stitches ¼in. apart from the neck edge to the roll or turn-over of the collar (Fig. 3).

Tack the neck edge of the coat and fit it on to see that the collar lies correctly. Stitch the neck edge seam, clip it at intervals so that it sets well, and press it open. Join the top section of the collar to the front facings, turn over the under collar, and catch stitch along the other edges and to the neck edge of the coat (Fig. 4).

Sleeves

Set-in coat sleeves are usually cut in two pieces, Raglan in two or three. Join the seams and press them open. The second seam is difficult to press on a table and should be done on a sleeve board if possible; otherwise pad a rolling pin with cloth, push it into the sleeve, and use it as a pressing board. Pin the sleeve in the armhole and try the coat on, making any adjustments necessary. Baste and stitch the sleeve into the armhole, clip the seams, and press them open. Turn the sleeve back at the lower edge, then tack and press it.

Adjusting the Hem

Try on the coat and mark the hem line, making it an even length all round. Tack it flat at the turn and press it. Measure an even width and trim. Bind the raw edge and catch stitch it to the coat, cutting away the hem behind the facing (Fig. 5).

In the coat illustrated the bottom of the facing was cut off to make the pockets, so the correct method had to be departed from in finishing the hem (Fig. 6).

Patch Pockets

Patch pockets are simple to make and are most suitable for a young girl's coat. If the material is patterned, make the pockets match exactly at the points where lines cross, or cut them on the true bias (Fig. 7). The lower corners can be rounded or straight.

The secret of making patch pockets successfully is to have them exactly alike and quite true and even. As an aid, cut a cardboard shape, omitting turnings, and use it as a pattern to cut each pocket piece. Place the cardboard over one pattern piece and press the seam allowances; do the same to the other pocket piece and both will be exactly the same.

Cut two linings, attach them to the top edges, and tack them under the

THE COLLAR

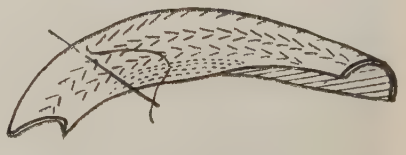


Fig. 3—Padding and running stitches in collar stiffening.

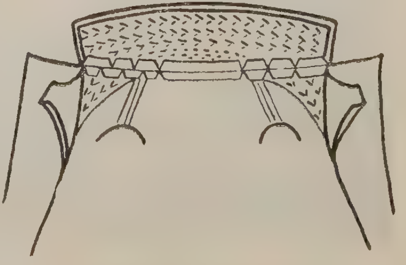


Fig. 4—The collar set on.

seam allowances so that the lining is caught when the pockets are stitched on to the coat.

Buttonholes

Buttonholes often present a difficulty to the home sewer, and bound buttonholes are usually found easier to make than tailored ones. Of course this task can be avoided by sending the coat to a tailor or a shop which does finishings.

Try on the coat and mark the positions for buttonholes and buttons. For bound buttonholes never cut the buttonhole before the binding is stitched in place. Mark the exact size and position on coat and binding. Put the binding on the right side of the coat over the cutting line and tack it in place very securely. Outline the cutting line with stitches, hand backstitching, or machine stitching, making the corners sharp and the lines even. Take the stitching through coat and interfacing only and not through the facing. Cut from the middle toward each end, stopping ¼ to ½in., and then cut to each corner, right up to the stitches. If the stitches are accidentally cut through, overcast them by hand.

Pull the binding through the buttonhole, watching the right side, and gently work it into shape until two even lines are showing on the right side and all raw edges are turning away from the buttonhole on the wrong side. Outline the buttonhole with small stitches on the right side, taking them in the seam so that they do not show. Turn to the wrong side and overcast on to the interlining. Cut a corresponding slit in the facing, turn in the edges, and catch stitch to the stitching on the buttonhole (Fig 8).

Padding the Shoulders

Shoulder pads for coats are usually made of wadding in several thicknesses and in a triangular or pear shape. Cut two shapes in lining or unbleached calico for each pad. Cut a layer of wadding to the same shape, but without turnings, and thin it out at the edges. Cut a second piece ½in. smaller all round and thin its edges also. Pin the lining on and seam it all round the edges (Fig. 9).

Try on the coat and pin the pads into position. Attach them to the seams firmly so that they will not slip in wear.

A NEW COAT FOR AN OLD ONE

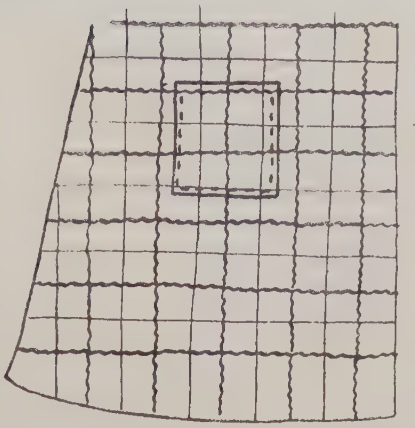


Fig. 7a—A patch pocket matching the pattern on the front of the coat.

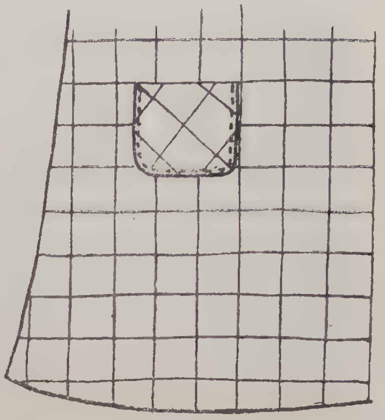


Fig. 7b—A patch pocket cut on the cross.

THE HEM

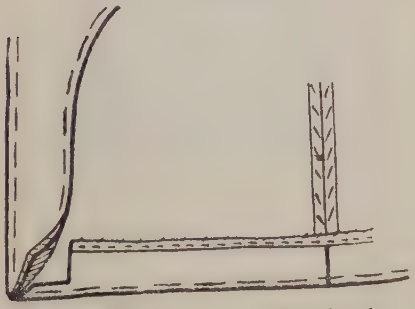


Fig. 5—The hem cut away under the facing.

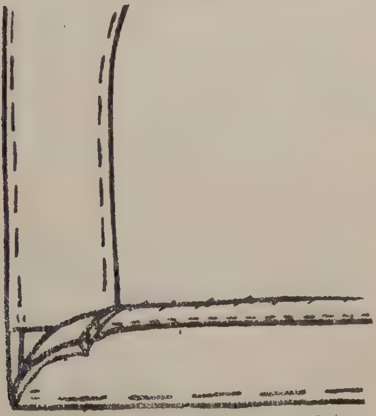


Fig. 6—The hem over the facing when the end of the facing is used for pockets.

MAKING THE BUTTONHOLES

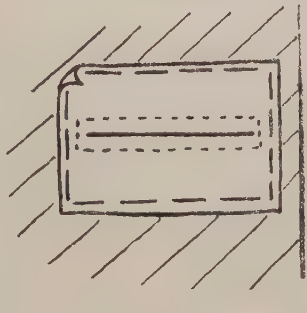


Fig. 8a—Binding stitched in place on the outside of the coat.

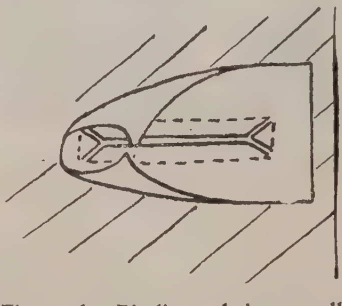


Fig. 8b—Binding being pulled through to the inside after the buttonhole has been cut.

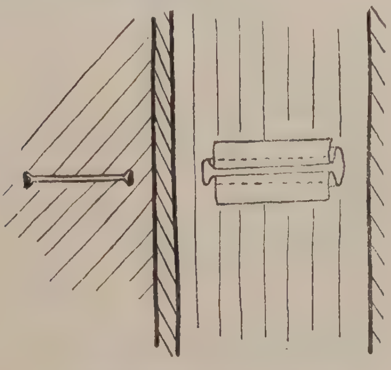


Fig. 8c—Stitching round the buttonhole on the inside.

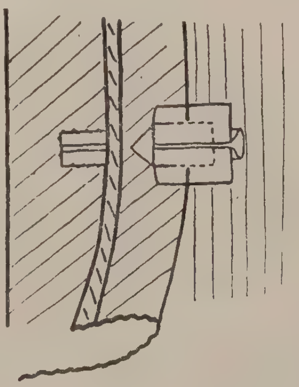
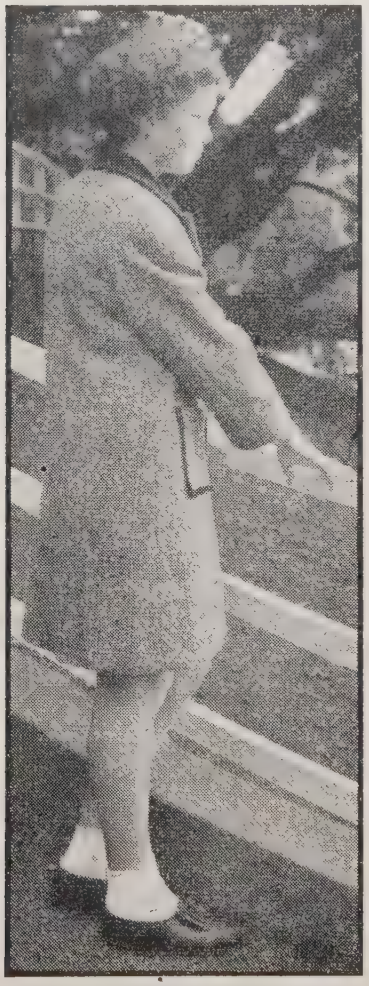


Fig. 8d—The coat facing cut and being stitched round the buttonhole.



The new owner shows the back view of the completed coat.

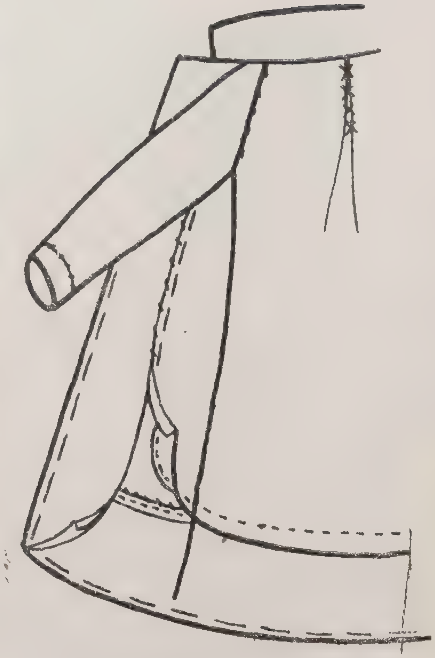


Fig. 10—Lining the coat. Note the pleat in the centre of the back.

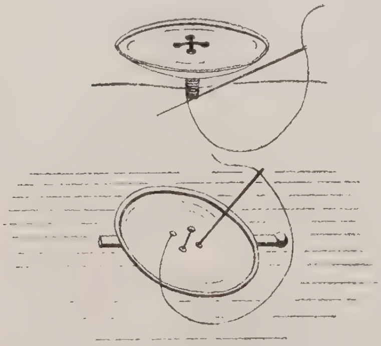


Fig. 11—Sewing on a button with a long shank.

Linings

Linings are cut by the coat pattern, making the back a little wider by placing the pattern ½in. in from the fold at the centre of the back. The fronts are cut narrower so that the lining does not extend more than ½ to 1in. over the facing. Make single seams in the body part, leaving the shoulder seams open. Seam the sleeves but do not set them in until later. Turn in the neck edge, fronts, and back shoulder seams and press them.

Turn the coat inside out and put it on someone or lay it flat on the table. Pin the lining in place, making a pleat at centre back (Fig. 10). Take the coat off and slip stitch the back shoulder edge over the front. Sew the lining to the armhole seams and catch the side seams to the coat at intervals as far down as the hip line. Herringbone the back pleat and slip stitch the neck edges and down the two fronts. Put the lining over the sleeve, turn in the top edge, and slip stitch over the armhole seam. Set a row of pins round the fore arm, turn it in at the lower edge, and stitch it to the coat. Hem the lower edge.

The finished garment.

Buttons

Sew on the buttons with firm thread and leave a long shank. Put a match or knitting needle between button and coat while making the first stitches, then remove it and wind the thread round the shank several times before finishing off at the back (Fig. 11).

All photographs in this article by Sparrow Industrial Pictures Ltd.

THE SHOULDER PADS

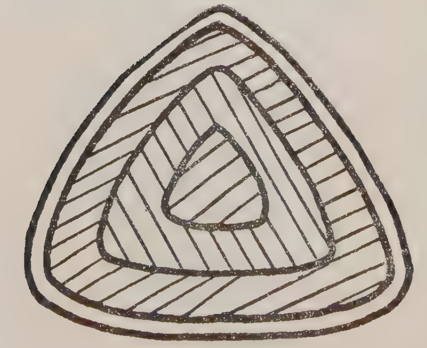


Fig. 9a—Making a shoulder pad. Layers of wadding set on lining material.

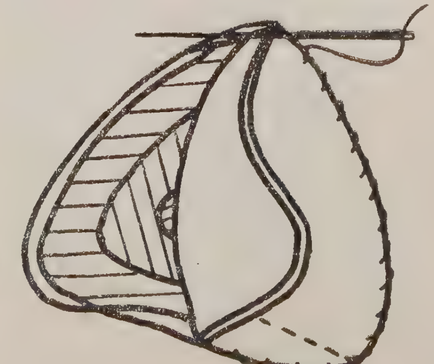


Fig. 9b—Top lining being overcast to the shoulder pad.

BOOKS for the Flower Gardener

EVERY home gardener should have at least a few carefully-chosen books to which he can turn for information and general interest. In this article J. P. Hudson, Horticulturist, Wellington, makes some comments on the choice of gardening books.

GARDENERS are sometimes surprised to learn that books which have been published on horticultural subjects now number many thousands, though not all of them would be worth a place in the home gardener's bookcase. Many of the earlier books, though written by craftsmen and full of valuable observations, are now out of date. They were written for the use of professional gardeners on large private gardens, where big staffs of gardeners had all the facilities they needed for the practice of their art. These books, with their references to using horse manure by the ton, separate glasshouses for special types of ornamental plants, and "full trenching" of the kitchen garden every winter, are as out of touch with present needs as old cookery books which say "take a dozen eggs and a quart of cream" in these days of food shortages.

However, many books have been written for the home gardener and can be of the greatest help to him. A good book puts the gardener in direct touch with the expert, whose knowledge and advice would never be available to him otherwise.

A book should be chosen as much by its author's reputation as by its title and subject, and reliable advice should be sought about which authors are regarded as the world's leading authorities on any particular subject.

There is a wide range of gardening books on general culture, and the others can be divided into several main groups:—

Books on the growing of special plants;
Books on garden sciences;
Books on garden design; and
Books on garden experiences.

Every home gardener should have at least one book on general culture to use for reference and to remind him, as he dips into it, of the many facets of garden work. Some monumental all-round gardening books have been published overseas, including the American Bailey's "Standard Cyclopedia of Horticulture," in three large volumes, at present priced at about £8 10s. The British Royal Horticultural Society's "Dictionary of Gardening," to be published shortly, is eagerly awaited. None of these works has particular reference to gardening in New Zealand, however, and nothing so ambitious has yet been attempted here, though the time may be ripe for something of the sort, possibly on a smaller scale.

Three general gardening guides, written for New Zealand gardeners, are available. They are necessarily limited in their scope, but every home gardener should have one of them for reference. They are:—

"Brett's Garden Guide," 1945, price 7s. 6d.

"Whitcombe's Complete New Zealand Gardener," by J. A. McPherson, Superintendent of Parks, Auckland, price 6s. 6d.

"The New Zealand Garden Dictionary," by J. W. Matthews, editor of "The New Zealand Gardener," price 6s. (illustrated edition).

D. K. Pritchard's "Vegetable Growing in the Home Garden," Bulletin No. 229 of the Department of Agriculture, price 6d., should be added to this list for its valuable information on vegetable culture.

Books on Special Crops

A multitude of books has been written on the culture of special crops, and in some ways they are most valuable books to the grower, as they cover their subjects in much greater detail than can books on general gardening.

As soon as a gardener finds that he is especially interested in some particular type of plants—for instance roses—he should borrow from the public library all the specialist books available on that subject, and then if possible buy the ones which seem to suit his purpose best. The National

Library Service holds no fewer than 20 books on roses, 12 of which have been published during the past 10 years.

All the specialist books at present in print have been written overseas, and that must be borne in mind when reading them. Allowance must be made not only for the six-month difference of seasons but also for the difference in climate between Britain, America, and New Zealand. The fact that New Zealand lies several hundreds of miles nearer the Equator than Britain has a marked effect on its climate, especially on the daily amount of daylight in summer and winter, and New Zealand's wide separation from any considerable land mass also tempers its climate compared with that of Britain, America, or Australia.

Several good specialist books have been written and published in Australia, and it will be a pleasing event when one is written in New Zealand. Meanwhile overseas specialist books must be relied on.

Books on Garden Science

In general, home gardeners are not particularly interested in so-called "scientific subjects," but the chemistry and botany of the garden can be a very fascinating subject.

The outstanding book on the botany of the garden is "The Living Garden," by E. J. Salisbury, published by G. Bell and Son, London, price about 11s.—a book which should be on every home gardener's bookshelf and frequently dipped into after first being read right through. Professor Salisbury, who is now Director of the Royal Botanical Gardens, Kew, set a new standard for books on garden science when he wrote this delightful and interesting book.

Another book which can be recommended to the home gardener is "The Young Gardener," by W. J. C. Lawrence, published in 1943 by George Allen and Unwin, London, price about 10s. Though written primarily for the young entrant to a horticultural career, this book has most readable and informative chapters on such subjects as garden chemistry, physics, plant growth, health, and disease. Among other books on various aspects of garden science which the serious gardener might enjoy, "Practical Plant Breeding," also by W. J. C. Lawrence (published by George Allen and Unwin, London, at about 9s.) has been mentioned already in these columns.

"Garden Pests in New Zealand," by D. Miller, published in 1944 in an enlarged second edition by Whitcombe and Tombs, Ltd., Wellington, price 8s. 6d., is another book worth a place on every gardener's shelf. It is readable, well illustrated, and informative. A similar book on garden diseases is overdue and would be welcomed.

Books on Garden Design

Practically all books on garden design published so far have been based on the design of large gardens. "The English Flower Garden," by William Robinson, who fought and finally broke the stiff, Victorian cult of ribbon bedding, is still regarded as a standard text book on the subject, and R. Sudell's "Landscape Gardening" contains much very valuable information.

There is a crying need for an authoritative work on the design, layout, and maintenance of the eighth or quarter-acre sections which comprise a great proportion of modern gardens. The traditional methods followed in larger gardens cannot be applied to these smaller sections. The whole question needs very careful study by an expert, and a new "philosophy of the small garden" should be worked out in the same way that Robinson worked out and fought for his "philosophy of the informal garden."

Books on Garden Experiences

Many eminent (and some not-so-eminent) horticulturists have written about their gardening experiences. These range from Beverley Nichols's light and entertaining books to the biographies of plant collectors, stories of whose adventures in distant lands add interest to the plants which were introduced through their efforts.

No attempt can be made to list or recommend books of this class, as the reader's enjoyment of such books will depend much on his or her particular taste.

Library Facilities

Books are expensive, and home gardeners should perhaps concentrate on buying those to which they are likely to refer often rather than those which will be read only once. Fortunately, it is possible for most home gardeners to borrow almost any book in which they are likely to be interested through one or other of the library services. Some cities and larger towns have a surprisingly-good selection of gardening books, though others have few books of that kind.

The smaller country libraries do not usually carry many gardening books but can draw on a wide range held by the central libraries, so the country reader is not handicapped apart from the fact that he cannot select his book from the shelf but has to wait for it to be procured for him.

The New Zealand Government National Library Service holds

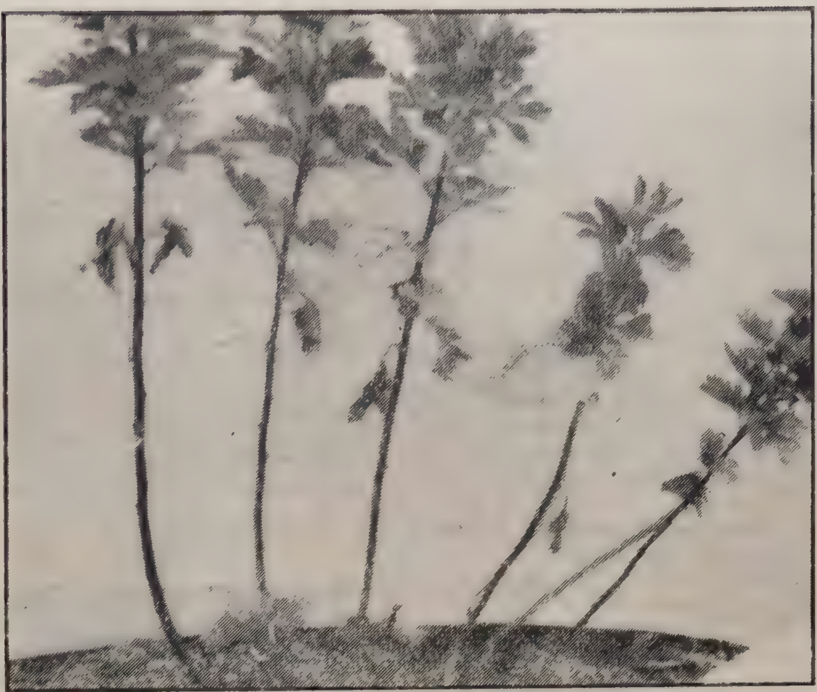
REMEMBER ARBOR DAY

[*Government Film Studios photo.*

Trees form part of the unconscious background to our lives, and we owe a great debt of gratitude to the early settlers and those who came later for planting trees in many bleak, windswept districts. We, in turn, should make our own gift to posterity by planting suitable trees on Arbor Day—the first Wednesday in August.

about 1200 books on gardening topics, most of them of recent date, and other central libraries are similarly well supplied in choice of titles. The National Library Service does not lend directly to the public, except to people living in remote places, more than 10 miles from a public library, but books from its collection may be obtained through most local libraries.

The period of waiting before a book can be made available to a borrower depends mainly on the number of copies held by the library and the demand for them. In the past the gardening public has made all too little use of the library services, and a growing and insistent demand for gardening books will be the greatest encouragement to librarians to procure more books suitable for the home gardener.



The stem of a healthy chrysanthemum should be furnished with green leaves to ground level. When the lower leaves go parti-coloured, wither up, and fall, as shown above, the plant has been attacked by the chrysanthemum eelworm.

Garden Work for August

Chrysanthemum propagation is now in full swing. Border chrysanthemums are often left in the ground undisturbed for several years, but that does not produce the best results. As the sturdiest growth and finest flowers are produced in the plant's first season, putting out new plants each year is well worth while. There are several ways in which plants can be raised.

Though raising new plants by dividing last year's roots is the easiest method, especially if no cold frame is available, raising them from cuttings is more satisfactory, particularly if a large number of new plants is required. Cuttings may be taken in spring from the previous year's plants still in the border, but most gardeners will have lifted selected roots in autumn, after the old flower stalks had been cut down, and planted them in a cold frame or very sheltered corner. These plants will produce a prolific supply of cuttings early enough in spring to ensure well-rooted plants for planting-out time, and meanwhile the border is left free in winter to be dug. Only young shoots growing from below the ground should be used, as those growing from the main stem above ground level do not make satisfactory cuttings.

Collars made by cutting the tops and bottoms out of food tins are useful to mark and protect small plants when they are first put out, ensuring that they are not lost or accidentally hoed out.

To prepare the cuttings, remove the bottom two leaves of each (preferably by cutting them off close to the stem rather than by pulling them off), and then with a very sharp knife or razor blade cut off the bottom of each stem just below the lowest joint—the place from which a leaf has been removed. Thin, very thick, or crooked shoots should not be used.

The cuttings should be dibbled with a flat-ended dibbler $\frac{1}{2}$ to 1in. deep and 2in. apart, either directly into the soil in the frame or into seed boxes filled with light, sandy soil, which can be stood in a glasshouse or frame while the cuttings root.

Cultivation: Unlike the vegetable garden, which is dug over thoroughly at least once a year, mixed flower borders are likely to be dug neither thoroughly nor regularly, as they are never completely empty. It is therefore important that the soil should be stirred as deeply as possible in areas which become temporarily vacant, but more harm than good is likely to be done by deep digging between shrubs and other established plants whose roots will be severely injured by deep cultivation. Where the ground between shrubs and in the borders has become hard after the beating of winter rains it should be loosened by shallow "pricking over" with a fork or hoe. At the same time a dressing of the complete flower border fertiliser recommended on page 325 of the "Journal" for March, 1947, can be applied, except in gardens where the soil is still naturally rich and fertile.

Gladiolus corms can be planted from now on in mild districts for very early flowers, but the main planting is not usually made until later. Close attention to skinning, inspecting, and dipping the corms before planting, as described in detail on page 424 of the April, 1947, issue of the "Journal," will be well repaid.

Glasshouse plants: Seeds of begonias, cyclamen, gloxinias, etc, sown last month should now have germinated. Prick off the seedlings into boxes or pots as soon as they are large enough to handle. Allowing seedlings to become large and crowded before pricking them out is a mistake, as it leads to serious mutilation of their root systems and a check to their growth.

Hardy annuals may be sown out of doors in early districts if the soil is in suitable condition, and seeds of the half-hardy bedding plants may be

THE FLOWER GARDEN IN AUGUST . . .

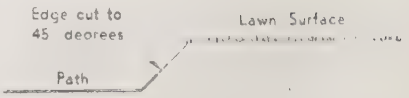
sown in boxes. In most districts, however, sowing is better delayed until next month, as boxes of plants ready too early are only a nuisance and become starved before they can be set out. That applies especially if bedding is to follow wallflowers or other spring-flowering plants which are likely to continue flowering until later than had been expected. "If in doubt, delay sowing" might be the motto in sowing flower seeds for boxed plants. A young, strongly-growing plant will give much better results after being planted than one which has been half-starved and waiting about in its box to be planted out for too long. The sowing of seed in boxes will be dealt with fully in next month's "Journal."'

Heaths which are becoming too tall and "leggy" can be rejuvenated by carefully packing soil in a mound between the main stems. The stems will soon root into the soil and the plant can then be lifted, pulled apart, and each rooted piece replanted.

"Nursery depth" is a term, sometimes seen in gardening books, which confuses the home gardener. It means the depth at which the plant was growing before it was dug up from the nursery. When a plant is lifted that depth is indicated by the appearance of a "soil mark" on the stem. Above that point the stem is relatively dry and usually darker in colour; below there the stem has quite a different appearance in both colour and texture. The soil mark is usually some distance above the uppermost root. When any plant is replanted it should be put in the ground at least as deep as it was before, as shown by the soil mark, and most plants are best put in a little deeper, with the soil mark just below the surface. It is a mistake to plant shallower or very much deeper than "nursery depth."

Tuberous begonias and gloxinias should now be turned out of last year's pots, where they have been resting. Shake the soil away from the corms and half bury them in boxes of potting compost to start into growth. Sprinkle the soil with tepid water to keep it just moist, and encourage the corms to start to grow.

Lawn edges should now be cut carefully to a new line with a sharp spade or half-moon cutter, but avoid removing more turf than is necessary to give a true edge. Every few years it may be necessary to build out the edge of the lawn again and returf it to prevent paths and beds becoming unduly wide. Lawn edges should always be cut at an angle of 45 degrees, sloping away from the grass; that produces an edge less likely to break down if it is stepped on.

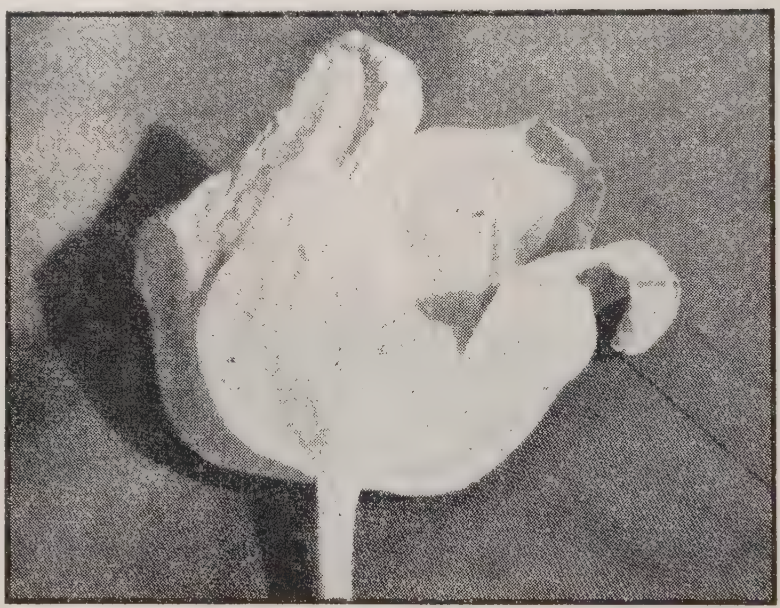


Roses can be pruned at any time in the winter when there is no further likelihood of severe frost, but as hard frosts can kill back the tips of rose branches, pruning is best left until the end of August or early September in districts subject to frosts.

Bush roses are pruned by cutting all the previous year's shoots to within a few inches of older wood and cutting out weak pieces altogether. **Climbing** roses are pruned by cutting back all side shoots to within an inch or two of the main stem, but the main framework of older wood should usually be left unpruned unless an old branch can be replaced by a young, vigorous shoot produced the previous season. Old flowering wood should be cut out of **rambler** roses if that has not already been done, but it is better carried out in late summer immediately after they have flowered.

Shrubs such as rhododendrons, camellias, and azaleas, which flower on the ends of the previous year's growths, should be pruned immediately after the flowers fade if pruning is necessary, but normally these shrubs require little pruning and should be cut as little as possible.

TULIP FIRE DISEASE



[*Photo News Ltd. photo.*

Tulip fire disease can later cause spotting of the flowers, which ruins their appearance, and purpling or spotting of the leaves. The spread of this disease can be checked to some extent by keeping a very close watch for small, twisted, and distorted shoots, often covered with a fine grey mould. Those are the "primary infections" of the disease, and usually arise from bulbs which were slightly infected when planted. The primary infections appear above the ground at about the same time as the normal shoots, but stay small and distorted and finally die. However, they infect neighbouring healthy tulips with the disease if they are left, giving rise to a secondary infection on flowers and leaves. All small, malformed, or distorted shoots should be dug out very carefully with their bulbs and surrounding soil as soon as they are noticed, put into a bucket, carried away, and burned at once. That precaution will often reduce or prevent later damage to flowers and leaves.

Soil for use in mixing seed-sowing composts should be sterilised, if that has not already been done, and other preparations made for providing the composts which will be needed during the spring. This subject is dealt with in detail in an article on pot plants on page 89.

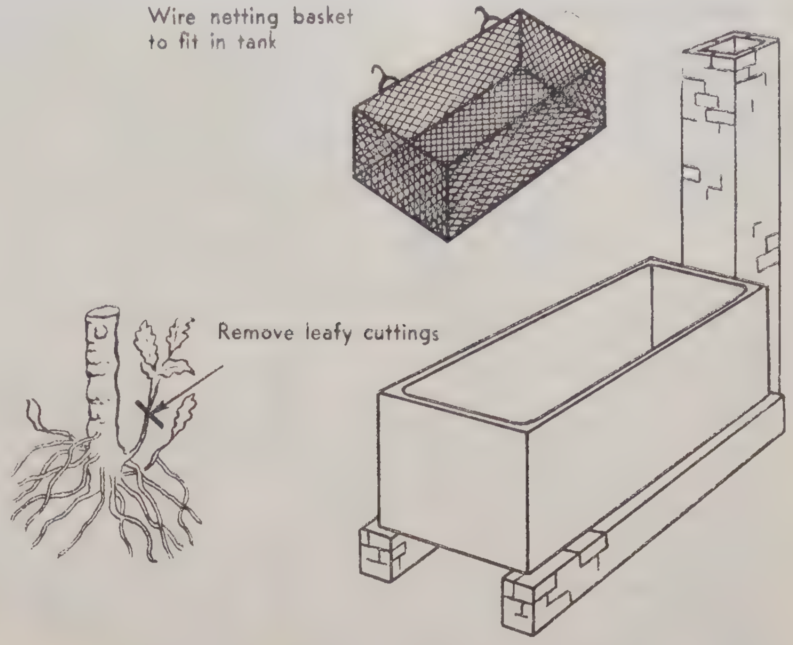
Reminders About Common Troubles

Caterpillars of various kinds usually start feeding on ornamental plants when growth begins in early spring. Leaf-roller caterpillars may now be seen on geraniums, and black, hairy, "woolly bear" caterpillars will be found eating holes in cineraria leaves.

At this season these holes are conspicuous and the culprits can usually be found and killed by hand, but probably the easiest way of effecting a lasting control is to spray all the cinerarias, geraniums, and other plants which show holes in their leaves with lead arsenate used at the rate of 1¼oz. of powder to 4 gallons of water. Great care should be used, as lead arsenate is a deadly poison. The powder should never be left about, especially where there are children, however plainly it may be labelled, but should be kept strictly under lock and key.

Hardly a season passes without news of a fatal accident to a child who has eaten the white powder in mistake for something else. That should be avoided by proper care, but there is much to be said for using only non-poisonous sprays in the home garden, and it is to be hoped that suitable non-poisonous preparations of, for instance, D.D.T. will soon be on the market.

TREATING CHRYSANTHEMUM EELWORM



A home-constructed tank suitable for hot-water treatment of chrysanthemum stools on a large scale. The home gardener can use the laundry sink (not the copper), controlling the temperature by adding hot or cold water. The chrysanthemum stool shown has been washed and prepared for immersion in the bath.

Chrysanthemum eelworms (*Aphelenchoides ritzema-bosi*) live in the leaves, where they cause dark patches which later turn nearly black, until ultimately the whole leaf withers and hangs down the stem before finally dropping off. The lower leaves are attacked first but the upper leaves are infested later, and the health of the plants may be undermined and the quality of the blooms ruined. This pest is extremely common and is present in almost all stocks of chrysanthemums, but where it is absent the greater vigour and strength of the plants can be noticed at once.

A full description of symptoms and methods of controlling eelworms was given in an article on pests and diseases of chysanthemums on page 91 of the July, 1946, issue of the "Journal." The most effective way of eradicating the pest is to wash the dormant stools thoroughly and immerse them for 20 minutes (30 minutes for stools with very thick stems) in water at a temperature of 110 degrees F., afterward plunging them into clean, cold water to cool off. This hot-water treatment kills all eelworms in and on the stools without affecting the plants. If stools thus treated are then planted out in, and the cuttings subsequently inserted into, sterilised soil or soil free from eelworm, perfectly clean plants can be produced for planting out.

To attain the correct temperature of 110 degrees as soon as possible the water should be a few degrees warmer when the stools are first thrown in. In small baths it may be as high as 116 degrees, but in larger baths 112 to 115 degrees will usually be hot enough to allow for the first drop in temperature caused when cold stools are thrown in.

The cheapest and most satisfactory thermometer to use is a floating dairy or household thermometer, which is relatively inexpensive. The cheaper thermometers, however, are rarely accurate enough for checking the temperature of hot-water baths for plant treatment, in which the temperature must be controlled to within a degree or less. The thermometer should therefore first be checked against one known to be accurate to ascertain how many degrees high or low it may be reading. A good way to do this is to check at, say, 100 degrees against a clinical thermometer, but be careful not to burst the thermometer by putting it in water at more than about 108 degrees F.

Buckets of hot and cold water should be kept by the bath to correct too-rapid fluctuations of the temperature of the water, which should not be allowed to rise above 112 or to fall below 109 degrees, but should be kept as near 110 degrees as practicable. Gardeners who use this hot-water treatment regularly will agree that it is not as difficult as it sounds.

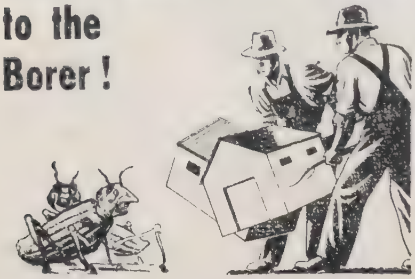
Stools which have been given the hot-water treatment are usually about three weeks slower than normal in producing cuttings. Allowance should be made for that delay if cuttings are required on a certain date, as for show chrysanthemums, which it is now too late to treat, though there is still time to treat the earlier-flowering types, which require a shorter growing season.

Unfortunately, unrooted cuttings cannot be given the hot-water treatment, as it usually kills them, but rooted cuttings can be tied in small bundles, surrounded by moss, and treated in the hot-water bath if that is more convenient than treating stools. Some of the leaves may turn brown after treatment, but the cuttings will soon produce healthy, clean leaves.

All photographs in this article by Photo News Ltd.

Farmers

Don't Feed Your Barns to the Borer!



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If you cannot get pasteurised milk, here is an easy home method of pasteurising it yourself; fill the lower part of a double boiler with water, place the milk in the upper part, cover, and heat until the water boils; allow it to boil for 3 minutes; remove and cool immediately by placing the upper part (which contains the milk) in a large vessel of cold water; change the water every few minutes until the milk is as cold as the water.

● **TUBERCULOSIS CAN SPREAD FROM COWS TO HUMANS, BUT *NOT* IF YOU**

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Keep this announcement for future reference. 21C

HEADING PHOTOGRAPH

Rolled oats can be used in place of breadcrumbs to coat rissoles in preparation for cooking.

COOKING WITH OATMEAL

By EVA TOPPING, *Rural Sociologist, Auckland.*

IS it true that one must go to Scotland to learn the uses of oatmeal? Perhaps the New Zealand housewife does not make so much use of oatmeal as does her Scottish counterpart; probably it appears on the table only as porridge. It is a good cereal, richer in food material than most of the others. The high starch content makes it an excellent heat and energy producer, and as it contains some protein it is also a tissue builder. It may be a little less easily digested because of the tough fibres and so requires thorough cooking, especially for children, elderly people, and those whose digestion is impaired through sickness.

Oatcakes

SCOTTISH oatcakes are cooked on one side on a girdle until the edges curl up; then they are toasted on the other side before the fire on a wire rack which is made to hang on the bars of the grate. Excellent oatcakes can be made on the hot plate of an electric stove and finished under a grill or the top element of the oven.

Put 2½ handfuls of oatmeal into a basin with ½ teaspoon of salt and pour over it ¼ pint of boiling water in which 1oz. of bacon fat, dripping, or butter has been melted. Mix them well with a wooden spoon, turn the mixture out on to a board sprinkled with oatmeal, and knead it a little with the hands. Divide it and shape the pieces into rounds. Roll each as thin as possible, keeping the rolling pin dusted with meal to prevent sticking, and cut each round into four. Take the board to the well-heated hot plate or girdle and slide the oatcakes on—any attempt to lift them is almost certain to crack or break them. Cook the oatcakes until the edges begin to curl, then remove them to a hot baking sheet and toast the uncooked side under the grill or top element of the oven. To test the heat of the girdle or hot plate sprinkle it with water; if the drops "dance" on the surface, the plate is hot enough for baking the oatcakes.

If the oatcakes must be baked in the oven, try this recipe:

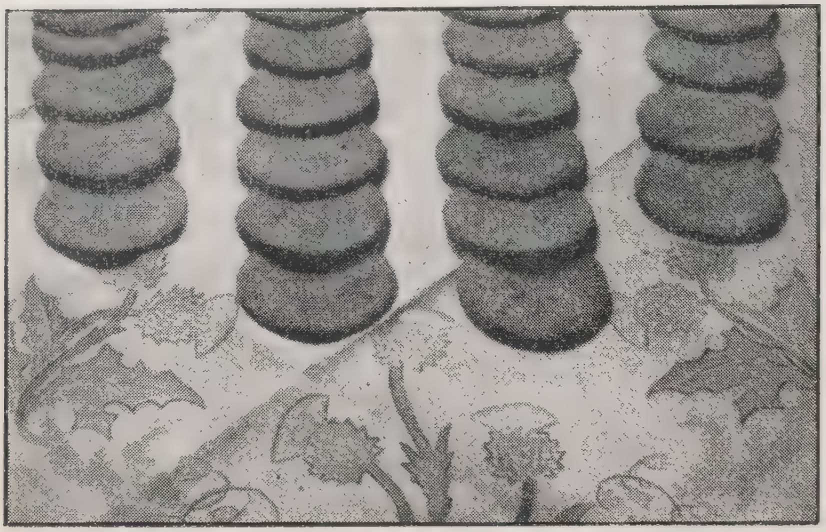
1 cup of oatmeal
1 cup of flour
Boiling water to mix
½ teaspoon of salt
¼ cup of dripping melted in 1 tablespoon of boiling water

Put the flour, oatmeal, and salt into a basin and add the melted dripping and water, using extra boiling water if the mixture is too dry. Roll the mixture thin on board, using oatmeal to dust the rolling pin and board. Cut the oatcakes into triangles or squares and bake them on an oven sheet sprinkled with oatmeal until they are lightly browned.

Store oatcakes in an airtight tin to keep them crisp. Serve a glass of milk, buttered oatcakes, a piece of cheese, and a stick of celery or lettuce leaves for a healthful mid-morning snack.

Oatmeal in Biscuits

Fine oatmeal makes biscuits which are crisp and nicely flavoured, medium oatmeal is used for the spicy parkin type, and rolled oats for the maca-



Savoury oatmeal biscuits.

roons and the nutty kinds of biscuits. Any of them make a welcome addition to the tea table or the school lunch box. Many of the biscuit recipes do not include eggs, which makes them useful when the hens are not laying. That for quick cake biscuits contains no flour, milk, or eggs and will be welcomed by asthma sufferers whose diet does not include these items.

Plain Biscuits

Mix 1lb. of oatmeal, ½lb. of flour, and 1 teaspoon of salt. Rub in ¼lb. of butter or butter and dripping mixture and mix the ingredients to a stiff paste with hot milk. Roll it thin, cut it into rounds, and bake them in a moderate oven for 10 to 12 minutes.

Sweet Biscuits

6oz. of flour
4oz. of sugar
2 tablespoons of milk
1 egg
5oz. of oatmeal'
3oz. of butter or lard
1 teaspoon of baking powder
Good pinch of salt

Mix the flour, sugar, oatmeal, baking powder, and salt. Rub in the fat and mix the ingredients with well-beaten egg and milk. Roll the mixture thin, cut it into shapes, prick them over with a fork. and bake them in a moderate oven until they are lightly browned.

Savoury Biscuits

1 cup of oatmeal
1 cup of grated cheese
1 cup of flour
1 teaspoon of baking powder
Salt and pepper
Milk
2oz. of dripping

Rub the dripping into the flour, baking powder, and oatmeal. Add the cheese, salt, pepper, and enough milk to make a dough which is not too moist. Roll it out as thinly as possible, cut it into rounds, and bake them in a fairly hot oven until they are cooked and nicely browned.

Parkins

4oz. of flour
½ teaspoon of ground ginger
2oz. of lard or dripping
1 flat teaspoon of baking soda
Milk
4oz. of oatmeal
½ teaspoon of ground allspice
2oz. of brown sugar
3oz. of golden syrup
Pinch of salt

Mix the flour, oatmeal, and salt, and rub in the lard. Add the sugar, spices, and soda, then the syrup, slightly warmed. Mix the ingredients to a light dough with milk. Form it into small flat cakes and place them well apart on a greased baking sheet. Brush them over with milk and bake them in a slow oven.

Quick Cake Biscuits

2 cups of rolled oats
1 cup of desiccated coconut
½ cup of sugar
Pinch of salt
1 level teaspoon of baking powder
¼lb. of melted butter

Put the rolled oats, coconut, sugar, salt, and baking powder in a bowl and mix in the melted butter by hand. Turn the mixture into a shallow tin and press it well down with the back of a spoon, packing the corners and sides firmly. Cook it in a moderate oven for half an hour, then take it out, cut it into squares or fingers, and bake them again for a quarter of an hour.

Oatmeal Macaroons

1½ cups of rolled oats
2 eggs
1 teaspoon of vanilla essence
1 tablespoon of melted butter
⅔ cup of sugar
¼ teaspoon of salt

Beat the eggs with the sugar until they are light, stir in the salt, vanilla, and melted butter, and add enough rolled oats to make a stiff batter—more or less than the amount specified according to the size of the eggs. Drop the mixture by teaspoonfuls on to a well-greased baking sheet, setting them well apart, and bake them in a moderate oven for 15 minutes.

Scones and Bread

For making brown bread or scones, half the flour in any of the usual recipes can be replaced by fine oatmeal.

Rolled Oats Bun Loaf

2 cups of boiling water
½ cup of golden syrup
2 teaspoons of salt
1 tablespoon of butter
¼ cup of chopped nuts
¾oz. of yeast dissolved in ½ cup of tepid water
1 cup of rolled oats
5 cups of flour
½ cup of raisins, sultanas, dates, or chopped prunes

Put the oats and butter into a basin, pour on the boiling water, and leave it to stand for an hour. Then add the syrup, salt, flour, and yeast mixture and beat it thoroughly with the hand for 7 to 10 minutes. Set the mixture to rise until it has doubled in bulk, and beat it by hand again, adding the chopped nuts and fruit. Turn it into well-greased tins and set it to rise

Left—Quick cake biscuits. Right—Perkins.

COOKING WITH OATMEAL

until it has again doubled in size. Bake the loaf for 50 to 60 minutes in a hot oven (375 to 425 degrees). The mixture is very slack and requires no kneading but thorough baking.

Puddings

Puddings for the sweet course have a "different" flavour if oatmeal is included in the ingredients, and for lunch or to serve with meat there are savoury oatmeal puddings. Here are some recipes for both kinds.

Oatmeal Fruit Pudding

3oz. of oatmeal
3oz. of flour
2oz. of dripping
½ teaspoon of baking soda
Milk to mix
1½oz. of sugar
½ small cup of golden syrup
2oz. of dried fruits, currants, sultanas, peel mixture (if possible)
Grated rind of 1 lemon

Rub the dripping into the flour and add the oatmeal, soda, sugar, prepared fruit, and lemon rind. Mix the ingredients to a slack dough with warmed milk and syrup. Turn the mixture into a greased basin and steam it for 2½ hours. Serve the pudding with a sweet sauce or custard.

Ginger Oatmeal Pudding

6oz. of flour
4oz. of oatmeal
2 teaspoons of baking powder
Milk to mix
3oz. of finely-chopped suet
1 teaspoon of ground ginger
2oz. of sugar
1 tablespoon of golden syrup

Sift the flour, ginger, and baking powder into a basin, add the chopped suet (or rub in an equivalent amount of dripping) and sugar, and mix with milk. Grease a pudding basin, put in the golden syrup, followed by the pudding mixture, and steam it for 2½ hours.

Savoury Pudding to Serve with Roast Pork

4oz. of breadcrumbs
4oz. of oatmeal
2 tablespoons of finely-chopped or grated onion
3oz. of chopped suet
¼ teaspoon of powdered sage
Salt and pepper

Soak the bread thoroughly (overnight if possible), squeeze it dry and beat it with a fork. Add the other ingredients, mix well, and moisten them with milk or meat stock to make a stiff mixture. Put it into a well-greased roasting tin and bake it in a moderate oven for about 40 minutes. Cut it into fingers and serve them hot with roast pork.

Herb and Oatmeal Pudding or Dumplings

½lb. of oatmeal
¼lb. of chopped suet
½ teaspoon of baking soda
Milk, water, or stock to mix
1 or 2 onions
1 teaspoon of chopped parsley
¼ teaspoon of thyme or mixed herbs
Pepper and salt

Parboil the onions and chop them finely. Combine the dry ingredients, add the onions, and mix them to a soft, dropping consistency with onion liquor or other liquid. Turn the mixture into a greased basin, steam it for 1½ hours, and serve it with gravy for a lunch dish.

Coating fish with oatmeal for frying.

For dumplings, make the mixture slightly stiffer, roll it into balls, and drop it into mince, brown stew, or soup.

Oatmeal Stuffing.

This stuffing is good with a boiling fowl, as it improves with the long boiling and does not escape into the liquor as would breadcrumb stuffing.

1½ cups of oatmeal
3 tablespoons of chopped suet
Milk or egg to bind
2 onions
Herbs, pepper and salt to taste

Chop the onions very finely and mix them with the other ingredients, adding sufficient beaten egg or milk to bind the mixture to a stiff consistency.

Other Uses for Oatmeal

Frying Foods

Use oatmeal instead of breadcrumbs for frying foods such as fish, sausages, and croquettes. Dip fish into milk and then seasoned oatmeal, and fry it in hot fat. Skin sausages and roll them in oatmeal before frying them.

Rolled oats make a good coating for fried or baked meat cakes, and can also be used as an "extender" instead of mashed potato or breadcrumbs.

Thickenings

Stews, minced meat, and soups can be thickened with oatmeal instead of flour. Allow longer cooking after the thickening is added than if flour is used.

Meat Loaves

When making meat shapes, meat loaves, or any meat mixture in which breadcrumbs are used, oatmeal may be substituted, always allowing a little longer cooking time.

Drinks

Oatmeal is much used for a harvest thirst-quencher. Allow 3 to 4oz. of oatmeal to 3 pints of water. Mix the oatmeal with a little of the water, then add the remainder. Let it stand for a short time and stir it well before use.

Porridge

Perhaps one method of making oatmeal porridge should be included—at the least it will serve to compare with the housewife's usual way of making this good breakfast standby.

General proportions are 1 cup of oatmeal and 1 teaspoon of salt to 5 cups of water. Heat the water, and just before it reaches boiling point sprinkle in the oatmeal gradually with one hand, while stirring vigorously with a porridge stick or wooden spoon with the other. Stir well until the porridge begins to boil, add the salt, and cook it steadily for at least half an hour, stirring occasionally. Boiling longer—even for 1½ to 2 hours—will improve the flavour of the porridge and make it more digestible. Long cooking brings out the sweet, nutty flavour and gives a jelly-like consistency.

If the early morning is a time of rush, make the porridge overnight and reheat it in the morning.

Rolled Oats Porridge

Rolled oats are cooked more quickly than oatmeal and can be served for a change from oatmeal porridge or when time is limited before breakfast.

Use 1 cup of rolled oats and 1 teaspoon of salt to 4½ cups of water. Sprinkle the rolled oats into the water just before it boils, stirring continually.

[*Photographs by Sparrow Industrial Pictures Ltd.*

SEASCAPE

ABOVE every other view a seascape is surely the most fascinating. I have always loved watching its changing moods. When I was quite a small child we lived for a while in St. John's, Newfoundland. We had a house on a hill and at the top of the house was an attic with a window overlooking the North Atlantic. From that window we three children used to watch for the icebergs in the springtime. As they broke away from the northern ice-fields during the thaw they would float down, often proving a danger to shipping. We could hear the noise of the firing as the men broke the ice which had accumulated in the harbour mouth.

TREES

What shall we do for the children
To give them joy in Spring,
To set their feet to dancing
And make their young hearts sing?
We will plant the marsh and wayside,
Duneland and dip and hill
With trees that will glow in the sunlight,
And glint and never be still.
With trees that are strong for climbing,
Branching, and smooth to the hand,
And tops that are turrets with loopholes,
Green fortresses watching the land.
And trees there shall be for beauty,
Slender and lithe and straight,
Flaunting their scented blossom,
Or bowed by their harvest freight.
And children will laugh in the branches
As they clamber in search of the breeze,
While envy and hate are forgotten
By their elders in the shade of the trees.
This, then, we will do for the children
That their children's children may sing
In a land of peace and contentment
The joys of childhood in Spring.

—Erica McNamara.

My brother was the proud possessor of a telescope, and many were the wonders he spied. For me, it produced a blur, my small fingers being unable to focus it properly—a fact I didn't admit. However, even with the naked eye we saw these huge castles of ice quite clearly and as Dad told us, "Only one-fifth is above the water." No wonder one sank the Titanic!—**"London Pride," Ashburton.**

The Gift of Making Friends.

Blessed are they who have the gift of making friends, for it is one of God's best gifts. It involves many things, but above all, the power of going out of one's self, and appreciating whatever is noble and loving in another.

—Thomas Hughes.

Go often to the house of thy friend, for weeds choke up the unused path.—A Hindu proverb.

WAKATIPU, QUEEN OF THE SOUTHERN LAKES

IN the Maori legends and early history concerning lovely Wakatipu, the "Queen of the Southern Lakes," Florrie Hogarth du Gruchy has found the ideal subject for her able pen. She has contributed historical articles to New Zealand periodicals for many years, her radio talks also proving popular, and it is pleasing to know that she is putting her extensive knowledge of the lake country into more permanent form. Although the booklet is small, it gives a concise account of Wakatipu with special reference to topographical details and the exploits of the pioneer explorers, both Maori and pakeha. There is an interesting section dealing with the first squatters, William Gilbert Rees, of Wales, who established a sheep run on the site where Queenstown now stands, and Nicholas Von Tunzelman (godson to Nicholas I, Tsar of Russia), the original owner of Fernhill, the 50,000-acre property on the opposite side of the lake. Two of the great rivers which flow into the lake are named after these worthy runholders.

The booklet is attractive in format and contains some fine photographs.

ACKNOWLEDGMENT

In the articles on modern furniture by Norma K. Metson in the April and May issues of the "Journal" it was omitted to acknowledge the designer of the furniture illustrated, D. E. Barry Martin, B.Arch., A.R.I.B.A., A.N.Z.I.A., registered architect, Wellington.

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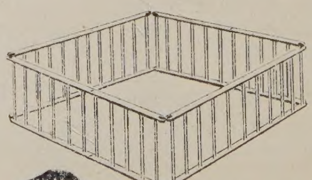

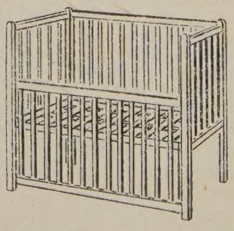

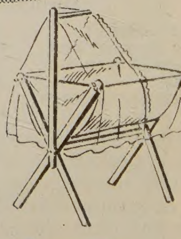

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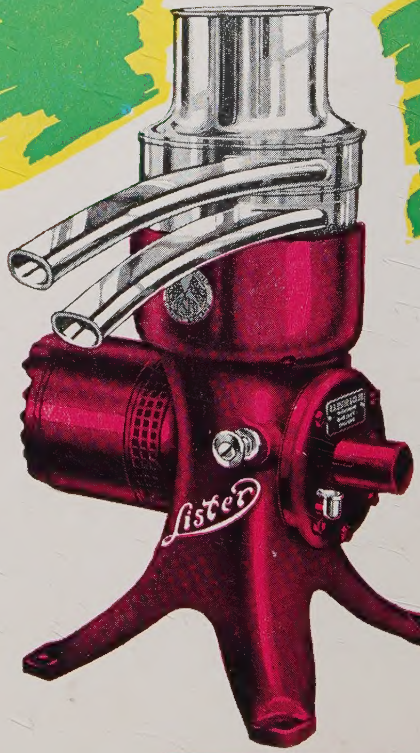

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